The Engineering and Mining Journal

VOL. LXXXVIII. NEW YORK, SEPTEMBER 4, 1909. NO. 10.

Sulphuric Acid Lead Chamber Construction

Increased Efficiency and a Substantial Saving in Lead and Ground Space Required Is Claimed for the New Type of Chambers

BY FREDERIC J. FALDING*

The first sulphuric acid chambers were merely lead boxes into which weighed quantities of sulphur and nitrate of soda were introduced and burned in the presence of water vapor. After reaction of the gases and the formation of sulphuric acid was complete, a new charge was introduced, the process being entirely intermittent.

At a later date the sulphur and niter were burned in special apparatus distinct from the chambers, and the resulting burner gas was carried to a series of such lead boxes, sufficient in number and capacity to permit the reaction of the gases and to secure their more or less quantitative conversion into sulphuric acid before the discharge of the residual gases into the air. This involved a continuous admission of burner gas (sulphur and nitrogen oxides, nitrogen and oxygen) and water vapor and a continuous discharge of the residual gases at the exit. No attempt as yet was made to recover the nitrogen oxides.

Gay Lussac towers were added at the exit in 1827 to accomplish the saving of the nitrogen oxides by means of their absorption in strong sulphuric acid and in 1859 the Glover tower was interposed between the burners and the chamber system to effect the partial cooling of the burner gas and concurrently the partial concentration of the weak chamber acid by means of the heat so abstracted together with the denitration of the nitrous vitriol produced in the Gay Lussac towers and the return of the nitrous oxides to the circulation of the chamber process.

The chambers have always been simply a series of enlargements of the flue or gas conduit, connecting, at first, the sulphur burners with the outer air or exit and later, the Glover and Gay Lussac towers. These enlargements of the flue retarded the speed of the gases, permitting them to mingle and react.

The principal dimension of the chamber space has aways been the horizontal axis in the same direction as the travel of the gas. As the chambers have been almost universally framed with wood construction, the hight and width have varied principally in conformity with considerations of carpentry—a width of 30 ft. and a hight of 24 ft. having been rarely exceeded, whereas a length of 100 to 200 ft. or over, for each chamber used to be quite common. Lead chambers have been constructed empirically and of all shapes and sizes but always of greatest length on the horizontal axis. Sometimes the gas would pass through from 4 to 10 chambers in series, having a total length of from 400 to 1000 ft. in all.

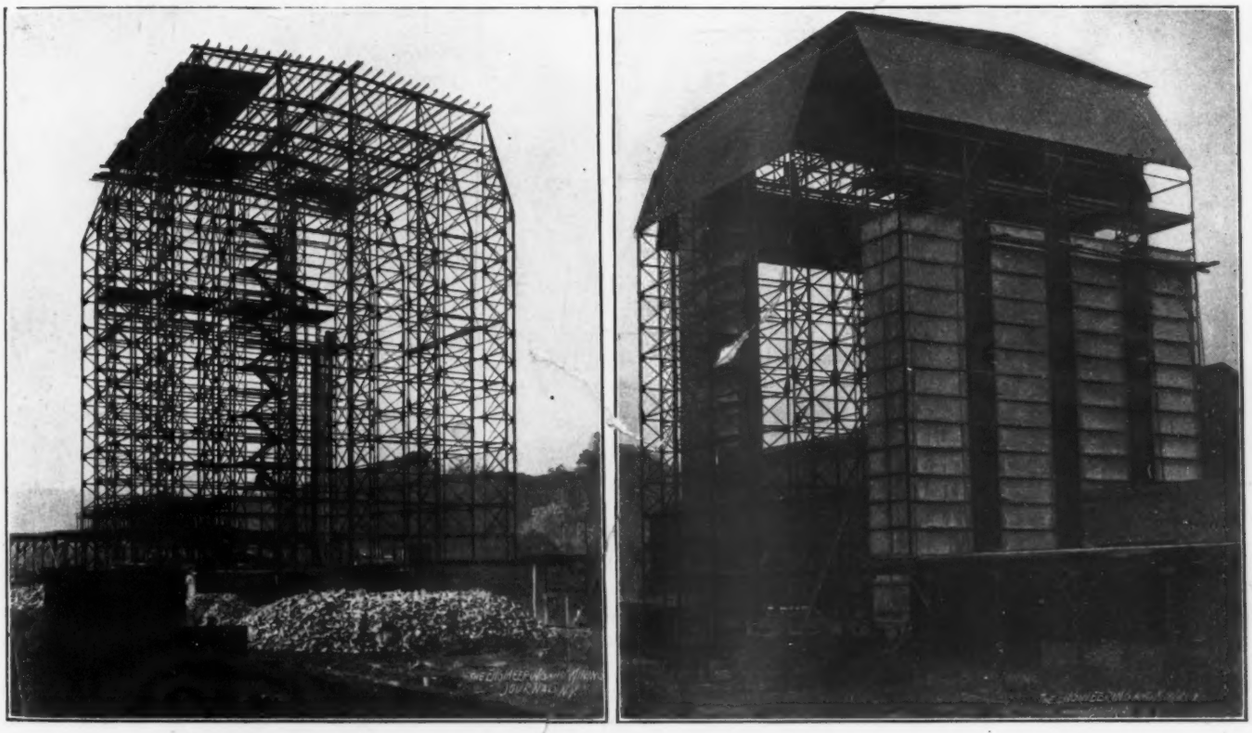


FIG. 1. STEEL FRAMEWORK AND PARTIALLY COMPLETED CHAMBERS AND TOWERS AT VANDERGRIFT, PENN.

Facts about the Chamber Reactions

The gas mixture on its first entrance to the chambers from the Glover tower is better fitted, in every respect, to react rapidly than it will be at any subsequent stage of its passage toward the exit. It is richer in SO_2 at this point and as it

*Consulting chemical engineer, 55 Broadway, New York.

passes forward through the chamber system it becomes poorer in SO_2 and more and more dilute and the reactions become rapidly more sluggish and less intense.

It is an admitted observation that irrespective of the length of the first chamber of a series, all the active work of such chamber is performed within the first 30 to 40 ft. of its length and that the remainder of the chamber is practically in active and reaction is not resumed until the gas has again been mixed and probably dried and cooled by passing through a comparatively small flue or special cooling apparatus in the nature of a surface or spray condenser, when a new zone of activity is induced in a succeeding chamber, the condition existing in the first chamber being reproduced, but in a lesser degree of intensity, due to the diminished percentage of the sulphur dioxide content of the gas and evidenced by a reduced temperature of the active zone. The same conditions with increasing reduction of activity apply to all subsequent chambers of the series until the absence of sulphur dioxide in the final chambers sometimes actually permits the conversion of the nitrous gases into nitric acid and peroxide, causing severe losses of niter and rapid destruction of the lead. It has even been the practice in some cases to admit a fresh supply of burner gas into the last chamber to counteract such conditions.

Now, just as in the old days of the intermittent process, providing a quantitative mixture of sulphur dioxide, oxygen, nitrous oxides and water vapor is introduced into a lead-lined chamber of sufficient size and the conditions are such as to prevent any mechanical interference, a quantitative reaction or series of reactions will rapidly take place.

It is quite easy to understand how in the horizontal system of flue enlargements or chambers such a quantitative reaction can be interfered with mechanically, as evidenced by the common case of the "loss of process" by a sudden storm or other meteorological conditions when the gas body has been pulled forward in the chambers by a sudden increase in suction at the exit until the sulphur dioxide not converted into sulphuric hydrate at the proper part of the chambers is carried into the Gay Lussac towers and the niter recovery interfered with to such an extent that the gas mixture at the beginning of the process does not contain its proper proportion of nitrous compounds. The same pull toward the exit affects the normal chamber process, but in a lesser degree, and prevents the quantitative reaction taking place in the first chamber where all the necessary ingredients are best balanced and where such quantitative reaction should naturally take place.

Various attempts have been made to secure a quantitative reaction in the first part of the chambers at the time when the gases are richest, better balanced and better fitted for active reaction. These attempts have been generally known as efforts to reduce the necessary chamber space. Among the schemes tried are the following: (1) Increase in the proportion of the nitrous oxides to the sulphur dioxide in circulation, thereby increasing the speed of the initial reaction—Système intense. (2) Shortening up the first chamber and passing the gases through cooling and drying apparatus or surface condensers before admission to succeeding chambers so as to increase the intensity of the secondary reactions.—Lunge plate columns, Gilchrist pipe columns, etc. (3) Division of initial volume of gas into two or more chambers in parallel instead of in series with a reduction of the secondary chamber space. All these, and some other methods (Meyer tangential, Pratt process, etc.) have only been partially successful, principally I believe on account of the flue shape of the chambers tending constantly to pull the gas forward before sufficient time has elapsed for quantitative reaction at the proper place, with results as above stated, i.e., reduced intensity of reaction, etc.

From the foregoing it seems to be reasonably clear that if the first part of the chamber system could be increased in size and the gas contents could be allowed to remain for a sufficient time free from interference by the draft pull to the exit then a quantitative reaction would take place under the best possible conditions both as to speed and completeness.

The Most Modern Type of Chamber

The difficulty in securing the desired condition lies in the difficulty of separating the gases which still contain sulphur dioxide and are capable of further reaction from those in which the reaction is completed, but as the reaction is strongly exothermic it seemed to me that it should be possible to take advantage of the laws of convection of gases to bring about such separation. To do so would clearly necessitate increasing the length of the vertical axis of the chamber or the hight in relation to all other dimensions, so as to allow relative zones of reaction and inaction therein, the incoming gas being admitted to the zone of reaction and the outgoing gas being drawn from the zone of inaction. The cubic contents of the chamber of course would have to be proportionate to the volume of gas admitted and the hight proportionate to the time necessary for quantitative reaction, and the gas travel would be vertically downward, subject to convection currents, instead of horizontally forward.

Bearing these considerations in mind it becomes clear what may be the effect of increasing the length of the vertical axis of the chambers or in other words the hight in relation to all other dimensions. The gas mixture, admitted to the

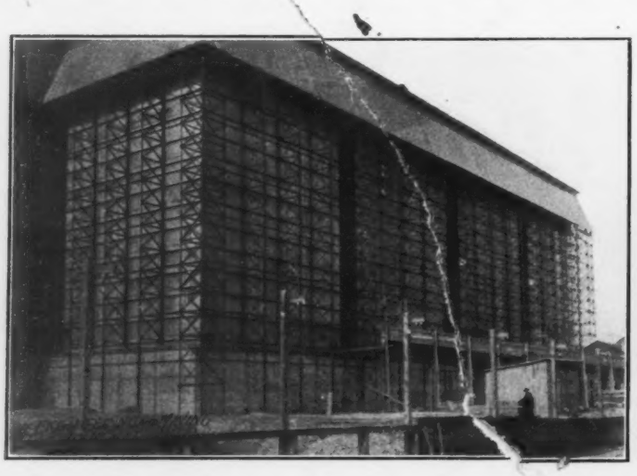


FIG. 2. GROUP OF HIGH CHAMBERS AT COPPER HILL, TENN.

FIG. 3. COMPLETED PLANT AT VANDERGRIFT, PENN.

chamber, immediately sets up a strong exothermic reaction. If the chamber is high, convection currents will be set up and the reacting gas will immediately tend to rise and to remain at the top so long as the active reaction goes on, only the inert, non-reacting, non-heat producing, and therefore cooler gases tending to return to the bottom of the chamber, probably down the cooler chamber sides where their heat is radiated. If the relationship of the hight to the area and the volume of gas admitted is correct, the reaction taking place in the chamber will be quantitative and the gas drawn from the chamber at the bottom will consist entirely of nitrous compounds and inert nitrogen with some oxygen. In other words the process will be completed in one chamber and the necessity of further chambers, which cost just as much as the first active chamber, for more and more sluggish processes or decreased efficiency in work done will be obviated and a great economy in cost of chamber space will be secured.

The accompanying diagram, Fig. 1, will best illustrate this point. Three systems of chambers are represented. No. 1 shows the actual dimensions of the new chambers as recently built by me near Pittsburg, Penn., and in Tennessee.[1] Capacity 175,000 cu.ft. (4952.5 cu.m.). No. 2 shows approximately the same capacity, 174,480 cu.ft., erected according to Dr. Theodor Meyer's tangential plan. No. 3 represents approximately the same capacity, 174,960 cu.ft., in horizontal chambers, not an unusual construction. Admitting that the efficiency of this cubic capacity is the same in each case, then the approximate relation as to surface area and lead required between the three systems is as shown in the accompanying table:

COMPARISON OF SURFACE AREA AND LEAD REQUIRED.

No. 1. 19,000 sq.ft. 7 lb. lead = 66.5 short tons (1765 sq.m. = 60.3155 metric tons).
No. 2. 31,412.3 sq.ft. 7 lb. lead = 110 short tons (2918.2 sq.m. = 99.77 metric tons).
No. 3. 32,004 sq.ft. 7 lb. lead = 112 short tons (2973.17 sq.m. = 101.584 metric tons).

As shown, there is a saving of approximately 40 per cent. of lead required in favor of my system of high chambers, for the same cubic capacity and without reference to the increased efficiency of such chamber space.

Referring to this high chamber, System No. 1, it is true that the gas leaving the chamber will still be too moist and at too high a temperature to permit its admission at once into the Gay Lussac towers and apparatus must be provided for the drying and cooling of the gas. This, however, can be done with much greater efficiency and economy than by providing additional chamber space.

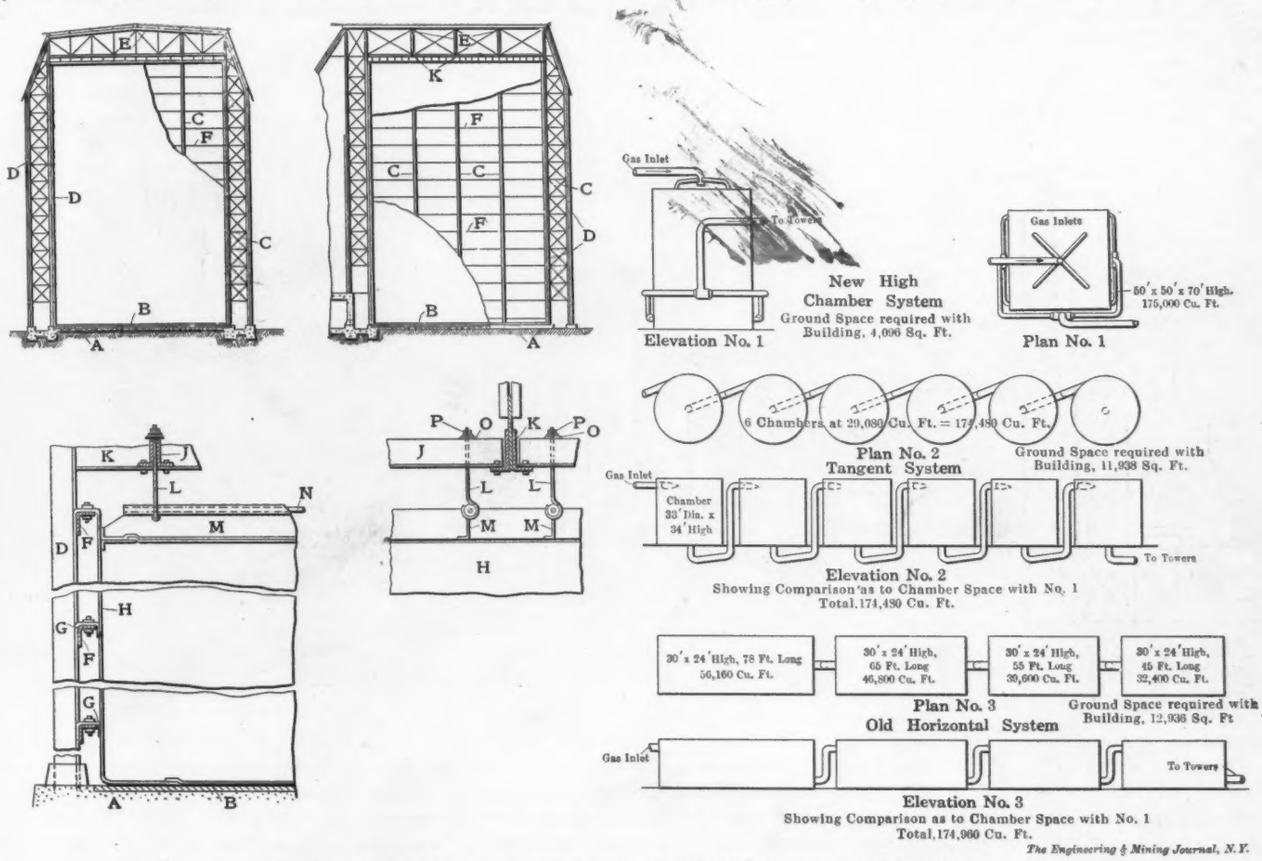

Gas Inlet
To Towers
New High Chamber System
Ground Space required with Building, 4,096 Sq. Ft.
Elevation No. 1
Gas Inlets
50′ x 50′ x 70′ High. 175,000 Cu. Ft.
Plan No. 1
6 Chambers at 29,080 Cu. Ft. = 174,480 Cu. Ft.
Plan No. 2
Tangent System
Ground Space required with Building, 11,938 Sq. Ft.
Gas Inlet
Chamber 33′ Dia. x 34′ High
To Towers
Elevation No. 2
Showing Comparison as to Chamber Space with No. 1
Total 174,480 Cu. Ft.
30′ x 24′ High, 78 Ft. Long 56,160 Cu. Ft.
30′ x 24′ High, 65 Ft. Long 46,800 Cu. Ft.
30′ x 24′ High, 55 Ft. Long 39,600 Cu. Ft.
30′ x 24′ High, 45 Ft. Long 32,400 Cu. Ft.
Plan No. 3
Old Horizontal System
Ground Space required with Building, 12,936 Sq. Ft
Gas Inlet
To Towers
Elevation No. 3
Showing Comparison as to Chamber Space with No. 1
Total 174,960 Cu. Ft.
The Engineering & Mining Journal, N.Y.

FIG. 4. DETAILS OF CONSTRUCTION AND CHAMBER-SPACE COMPARISONS

Recent Installations

Two sulphuric acid plants have recently been constructed, by me, on this principle with chambers 50x50 and 70 ft. high. In both places the chambers function in identically the same way, i.e. they are hottest at the top and cool gradually to the bottom where the difference in temperature between top and bottom, taken with side bent-thermometers, varies from 22 to 7 deg. F., according to the intensity with which the system is being driven. When the chambers are in normal condition in neither case does the gas leaving the chambers contain any SO_2 and the reaction taking place in the chambers is therefore quantitative.

It is too soon to state what the ultimate capacity of this form of chamber will be. There were few data available for such a radical change in construction. The one plant was supplied with fluctuating gas diluted with carbon dioxide from copper matte-smelting furnaces, which in itself was a novel undertaking. At the other plant, which was the first to be built, consisting of one chamber (175,000 cu.ft.) with Glover and Gay Lussac towers and a small cooling column, the chamber capacity was found to be entirely in excess of the burner capacity; in other words the chambers proved capable of doing more work than had been anticipated. By forcing the burners, however, to an undue extent which could not be maintained for a great length of time, the following results have been attained

[1] U. S. patent 470,189 of 1900.

and it is confidently expected that with adequate gas supply, these results can be obtained normally and can probably be bettered. These results were obtained during the month of May, neither in hot summer nor the cold winter.

Test No. 1.—Sulphur, 25,600 lb. (11,609.6 kg.) yielding 48 tons (43.536 metric tons) of 60 deg. B. acid in 24 hours. Equal to 1 lb. of sulphur to 6.85 cu. ft. of chamber space (1 kg. S. to 0.4274 cu. m.). Average gas, 7.9 per cent. SO_2. Average N_2O_3 in nitrous vitriol 2.2 per cent. $NaNO_3$ 95 per cent., 720 lb. (326.52 kg.) = 2.81 per cent. on sulphur burned. Average difference between temperature at top and bottom of chamber 7 deg. F. (3.88 deg. C.). Temperature of gas entering Gay Lussac towers, 114 deg. F. (45.5 deg. C.).

Test No. 2.—Sulphur, 23,200 lb. (10,521 kg.) yielding 43.5 tons (39.45 metric tons) of 60 deg. B. H_2SO_4 in 24 hours. Equal to 1 lb. of sulphur to 7.55 cu.ft. of chamber space (1 kg. S. to 0.4709 cu. m.). Average gas 8.1 per cent. SO_2. Average N_2O_3 in nitrous vitriol = 2.19 per cent. Average $NaNO_3$ 95 per cent., 720 lb. (326.52 kg.) = 3.1 per cent. on sulphur burned. Average difference between temperature at top and bottom of chambers 8.3 deg. F. (4.61 deg.). Temperature of gas entering Gay Lussac towers 113 deg. F. (45 deg. C.).

At this plant the normal burner capacity does not exceed 16,000 lb. (7256 kg.) of sulphur in 24 hours or 1 lb. of sulphur to about 10 cu.ft. of chamber space and at this rate the plant readily takes care of the gas with a reasonably low consumption of nitrate of soda.

It is evident that the gas, especially when the chambers are performing high duty, enters the Gay Lussac towers at far too high a temperature, although the constant and high percentage of the N_2O_3 content, 2.2 per cent., of the nitrous vitriol, the complete absorption of the nitrous oxides in the Gay Lussac towers, the reasonable consumption of nitrate of soda, the high yield of acid and the failure to find the presence of SO_2 by the ordinary gas tests, show conclusively the complete oxidation of the SO_2 in the chamber. When adequate burner capacity and sufficient cooling apparatus between the chamber and the Gay Lussac towers are installed, the efficiency as well as the economy of this method of construction would seem to be evident. Attention might also be called to the great economy of ground space occupied by these chambers, approximately a saving of 66 per cent. in favor of the high chambers for the same cubic capacity and without reference to the increased efficiency of such chamber space.[2] The general arrangement and relative proportions of such a plant are shown diagrammatically in Fig. 5.

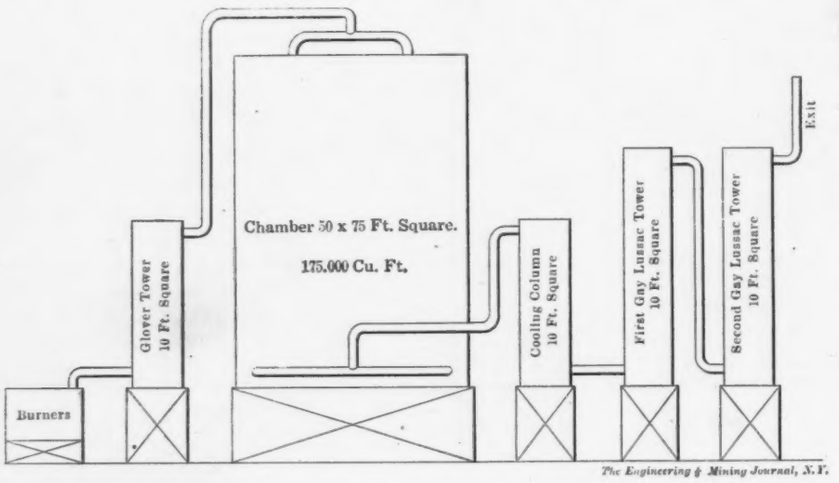

Chamber 50 x 75 Ft. Square.
175,000 Cu. Ft.
Glover Tower 10 Ft. Square
Cooling Column 10 Ft. Square
First Gay Lussac Tower 10 Ft. Square
Second Gay Lussac Tower 10 Ft. Square
Exit
Burners
The Engineering & Mining Journal, N.Y.

FIG. 5. DIAGRAM SHOWING RELATIVE PROPORTIONS OF A SINGLE HIGH-CHAMBER PLANT

Construction of Chambers

The chambers are built upon a slab of reinforced concrete, *A*, Fig. 4, which may rest directly upon the ground or which may be supported upon concrete pillars in such a way as to provide a room or basement which serves for the tanks and pumping apparatus for the acid circulation and other purposes. On this slab is placed a layer about ¾ in. thick of specially prepared asphalt *B*, perfectly smooth to receive the bottom lead of the chambers.

The framework of the chamber consists of a number of steel side trusses *C* with Z-bar chords or posts *D*. These trusses or truss posts at the bottom are bolted to suitable anchorage embedded in concrete piers and at the top carry the roof trusses *E*. These side trusses are tied in place by angle-iron girts *F*; those on the inner side of the truss carry the lead sides of the chambers which are connected to them by continuous horizontal straps *G* burned to the lead sides and clamped and bolted to the angle-iron girts in such a way that the angle iron is in contact with the strap only and does not touch the side lead sheets *H*. The girts at the outside of the vertical trusses serve to attach the sheathing of the building to the lead sides of an adjoining chamber. The roof trusses *E* are connected by a series of pairs of angles forming joists *J* which rest upon the lower chords of the trusses *K* and are bolted to them. Hook bolts *L* pass between these pairs of angle and engage in specially constructed straps burned to the top of the chamber lead *M*. These straps are continuous and are reinforced with ⅜ iron rods *N*. These straps also greatly assist radiation from the chamber tops and sides. The hook bolts are supported by cast iron washers *O* resting on the pairs of angles and may be adjusted as to length by the nuts *P* threaded to the bolts and resting on the cast-iron washers. The outer chords of the truss may be flat or so shaped as to conform to the roof slope desired.

This framework, though light, is rigid and strong and the details of construction are such as to allow great facility of access for repairs or painting. At no point does the framework come into actual contact with the lead sheets forming the sides or top of the chambers.

The Chinese government has granted a concession to work gold mines in three districts of Jehol, little more than 100 miles in a northeasterly direction from Peking. The feature of this concession is the combination of Chinese and foreign capital, the concessionaires being an Anglo-Chinese company known as the Ping Yuen Company, the capital of which is to be subscribed in equal proportions by Chinese and foreigners.

The mineral production of Queensland during 1908, according to the *Report* of the Department of Mines, Queensland, amounted to £3,844,487. All minerals other than gold showed a decrease from the output of the preceding year, and there seems to be no ground for expecting a better record in 1909.

---

[2]At the Tennessee plant, using smelter gas, a series of gas tests was made in December, 1908, under the direction of N. L. Heinz; the average results are given below. On Dec. 8 and 9 the high percentage of the burner gas precluded the possibility of there being a sufficient excess of oxygen, on account of the dilution of the gas with CO_2, as will be more fully explained in a future article. This accounts for the SO_2 present at the exit of the chamber. At the time these tests were being made the condition of the smelting furnaces was most unsatisfactory and the chamber process was by no means at its best.

	Dec. 6.	Dec. 7.	Dec. 8.	Dec. 9
Entrance to Glover, per cent. SO.....	6.8	6.1	7.8	8.4
Exit from chamber, per cent. SO_2.....	none	none	0.33	0.46
Exit from cooling chamber, per cent. SO_2.....	none	none	none	none
Entrance to Gay Lussac, per cent. SO_2.	none	none	none	none
Exit from Gay Lussac, per cent. SO_2.	none	none	none	none

Copper in the Eastern Townships of Quebec

By G. R. E. Kennedy*

In the region above Sherbrooke, in the eastern townships of Canada, there are many deposits of pyrite carrying low percentages of copper. The ore from this region, though not rich enough in copper to pay for shipping to England, has been proven payable where proper mining methods are adopted and smelting facilities afforded. The great handicap to the rapid development of the district is the lack of a customs smeltery at some central point, like Sherbrooke.

Capleton and Eustis Mines

The two largest mines in the region are the Capleton and the Eustis. The former is owned by the Nichols Copper Company, the latter by Colonel Eustis, of Boston. Both of these mines have been in successful operation for about 40 years. The Eustis is developed to a depth of 3000 ft., employs from 150 to 175 men, and produces about 1500 tons of ore per week. The ore contains as high as 45 per cent. sulphur, and much of it is shipped to chemical firms in Boston, who use the sulphur, shipping the residue to the Eustis smeltery in Norfolk, Va. The Nichols Copper Company also takes several hundred tons of the residue each month. The mine is well equipped, and good accommodations are afforded the men.

Other Properties

Over the range to the west of Sherbrooke is situated the Norton property owned by A. O. Norton, of Boston. At this mine a large tonnage of ore has been developed, and it is said that the erection of a smeltery is contemplated. To the north is the pioneer mine of the region, the Ascot, a well equipped property under the management of John McCaw. The Smith holdings at Lake Memphremagog are also being actively developed now by the same men who are working the MacDonald lands in Weedon. A new property has also been recently opened in Ditchfield.

*Mining engineer, Sherbrooke, Que.

FIG. 6. LEAD BURNERS AT WORK ON UPRIGHT SEAMS IN CHAMBERS

Coal Production of Missouri in 1908

Advance figures on the coal production of Missouri for 1908, made public by George Bartholomaeus, secretary of the Bureau of Mines and Mine Inspection of Missouri, show that the total output for 1908 was 3,383,991 short tons, as against 4,355,494 tons in 1907, a decrease in production of 971,005 tons, or 22.28 per cent. The total value of all coal mined in 1908 was $5,610,212, as against $7,306,125 in 1907, a decrease in value of $1,695,913. Thirty-five counties contributed to this production.

The report states that mining machines were in use in but seven counties, and the total machine coal mined was 491,676 tons, or 14.53 per cent. of the total production. There were 10 fatal accidents and 37 nonfatal accidents. Out of 47 accidents, 31 were caused by falls of roof. The death rate per 1000 in 1908 was 1.06, as against a fraction of less than one in 1907. The total number of men employed in coal mines of the State during the year was 9391, as compared with 9433 in 1907.

The reports of operators to the Bureau of Mines show that many of the smaller mines which operated in 1907 closed down entirely in 1908, and the big producing mines did not work full time. The average price per ton for coal shipped by railroad and not sold locally during 1908 was $1.71 per ton, an increase of 3¼c. over the price of 1907.

The Habit of Observing

The efficiency of a mining engineer is to a high degree dependent upon his ability to see and remember small details from a passing glance. In underground operations it is not possible to keep a record of all the small features of rock structure encountered, yet it may be that such unnoticed trivialities have a bearing upon the question in hand and the knowledge of their existence may throw light upon an otherwise knotty problem. For instance, in a stockwork deposit the cutting out of a small stringer from the main series of fractures may give a clue to the position of an orebody that has been lost in following the main series.

One who has not acquired the habit of observing and remembering might never detect the presence of this stringer, and even if he did notice it, would probably immediately forget about its existence.

To train one's self into this habit or faculty requires time but is not difficult, the most common method being to glance into shop windows in passing and then trying to write down as many of the articles displayed as can be remembered. After a time it will be found that nearly the whole exhibit can be recalled.

One who has trained himself in this way will find his memory to be a storehouse of facts recorded unconsciously upon each visit to a mine or part of the country new to him, and which will be ever at his disposal for reference when a similar circumstance is encountered.

A great deal of interest continues to be displayed in the South Lorrain district, Ontario, and from the work done so far it is fair to assume that this section will be one of the most important outside of Cobalt. During the coming week a car of high grade and a car of medium grade will be shipped from the Kelly. The Wetlaufer will also ship 40 tons of high-grade ore, and probably a car of medium. The Wetlaufer is drifting at the 60-ft. level on the vein in the shaft, and they have crosscut to a parallel vein, on which they are also drifting. The vein in the shaft is about 6 in. wide, carrying a good amount of high-grade ore. The parallel vein is 12 in. wide with 6 in. of smaltite, carrying some silver. So far the Keely has experienced considerable trouble with its new plant.

Smelting Refractory Lead Ores at Laurium

From 80,000 to 90,000 Tons of Lead Ore, Mostly Oxidized, together with About 50,000 Tons Mixed Lead and Zinc Ore, Treated Yearly

BY L. GUILLAUME*

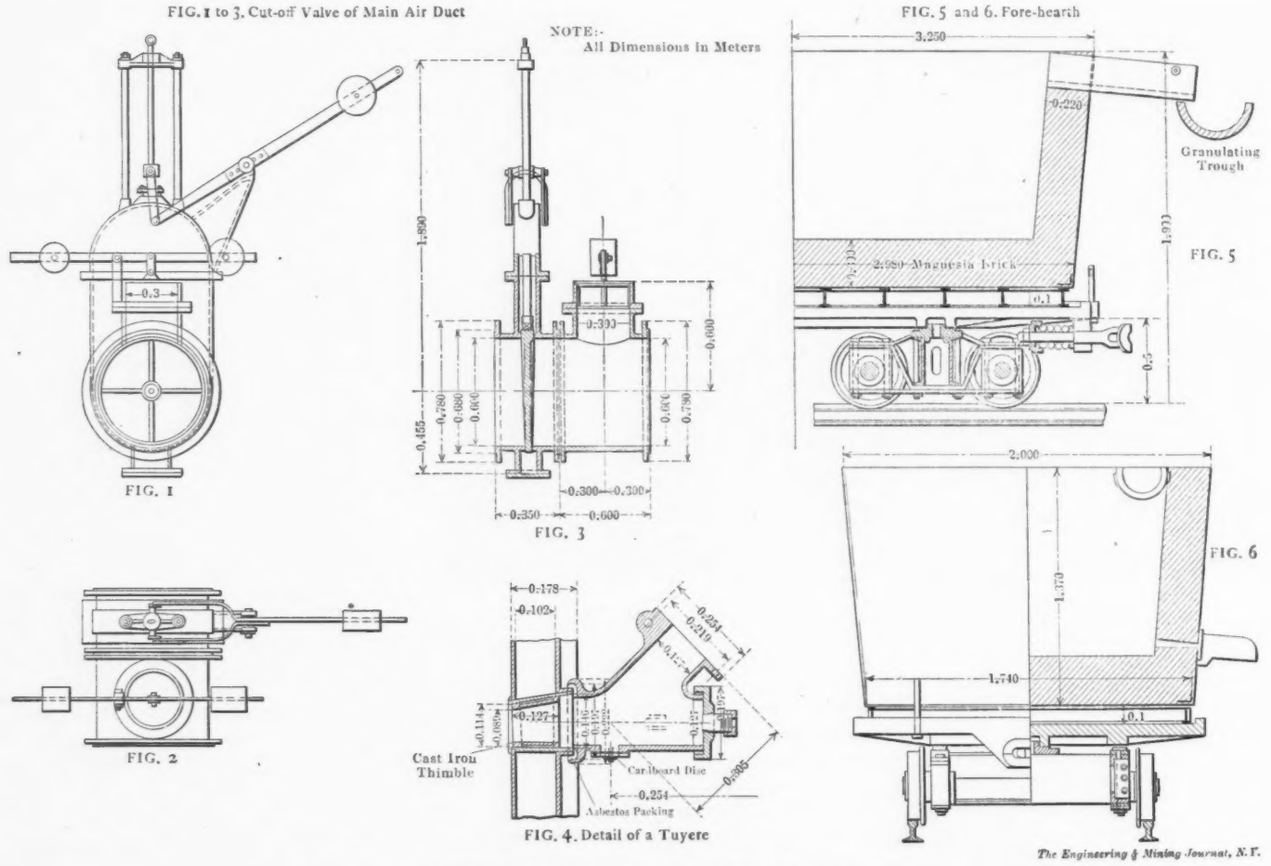
The Compagnie des Mines Francaise du Laurium is working comparatively important deposits of lead and zinc ores at the extremity of Attica. The zinc ores are exported, but the lead ores are smelted, the work lead then being exported. The tonnage of lead ores, most of which are oxidized, amounts to 80,000 to 90,000 tons per year. The northern district, in addition, yields annually 50,000 tons of mixed lead and zinc sulphides, which, after mechanical separation, afford 7000 to 8000 tons of galena concentrates carrying 50 per cent. lead. After roasting, these latter are mixed with the oxidized ores and smelted with them. The average content of the smelted ore ranges between 10 and 12 per cent. lead. The problem at Laurium is, therefore, to treat ores low in lead and silver.

Metallurgically, the ores are quite refractory. They are high in calcium carbonate, zinc oxide and alumina, and frequently the zinc is equal to the lead in amount. The low percentage of lead precludes the addition of barren fluxes and none are added. The slags are, therefore, hard to fuse at the usual temperature of the ordinary lead furnace. These refractory ores, which are the heritage of past generations of lead workers, have compelled this company to adopt new methods of smelting. Following American ideas it has designed a plant which is probably superior to any similar plant in Europe for the treatment of low-grade lead ores.

The Old Method

The old furnace, an illustration of which is herewith given, had been but slightly modified since it was brought into the country from Spain about 40 years ago. The blast, at a pressure of 25 to 30 cm. of water, was introduced through four tuyeres. The lining was local schist and the crucible was brasque. Lead was discharged two or three times per 24 hours. The slag discharged periodically into little conical pots holding about 50 kilograms.

The disadvantages of this furnace were its small capacity, 25 tons of charge per 24 hours, its high consumption of coke, 17 to 18 per cent., and its lead losses, 20 to 25 per cent. Neither would this primitive furnace permit of the economical treatment of refractory ores. The temperature at the tuyeres was not high enough to slag the zinc and the lime, the lining became covered with accretions, the crucible became obstructed and a campaign would hardly ever last more than two months. The work was also unhealthy for the workmen, not only because of the frequent eruptions of lead fumes, but on account of the arsenic which was present to the extent of 30 per cent. in the flue-dust.



DETAILS OF NEW LEAD FURNACE AT LAURIUM

NOTE—Abstracted from *Annales des Mines*, Tome XV, 1909, first number.

*Chief metallurgist of the Compagnie Francaise des Mines du Laurium, Laurium, France.

The company had 12 of these old furnaces with a daily capacity of 300 tons of charge, from which they produced 25 to 28 tons of work lead.

The New Furnace

The new furnace, the metal parts of which were furnished by the Colorado Iron Works, is of the same type as the largest in use in the United States. One large unit was selected instead of two small ones in order to gain the following advantages: High temperature in the zone of the tuyeres, which would fuse the refractory ores; reduced consumption of coke; reduction in labor per ton; more satisfactory operation of a fore-hearth. It was believed that these advantages would outweigh the disadvantage of having to rely upon a single furnace, even though an accident to it would shut down the works completely. The dimensions of the furnace are: Section at the tuyeres, 4.06 × 1.22 m., or 4.95 sq.m.; total hight from foundation to charging floor, 8 m.; hight from tuyeres to charging floor, 6 m. This relatively great hight was purposely adopted in order to reduce the loss of lead in the flue dust. The water jackets rest on the crucible, but the masonry lining is independent and is supported by four columns.

The accompanying section shows the construction of the hearth. It rests on a masonry foundation surmounted by an iron sheet, 2.9x5.5 m. The inner lining of the hearth consists of brick made of three-quarters magnesia and one-quarter chrome ore containing 50 per cent. chromic oxide. At the right of the figure is shown a tap hole for use when the crucible is to be emptied, and to the left is the automatic siphon. The outer walls of the crucible are made of 10-mm. sheets, reinforced by I-beams; this kind of wall seems to be much more durable than the customary ribbed cast-iron plates, which are soon broken by unequal expansion.

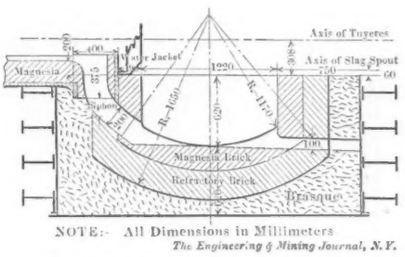
The Laurium ores yield, on smelting, an abundance of speiss, containing about 33 per cent. arsenic, so that special precautions have to be taken to avoid destruction of the crucible lining as ordinarily made. At the temperature in the zone of fusion either basic or acid brick are rapidly destroyed, but the magnesia-chrome brick prove highly satisfactory.

High Water Jackets

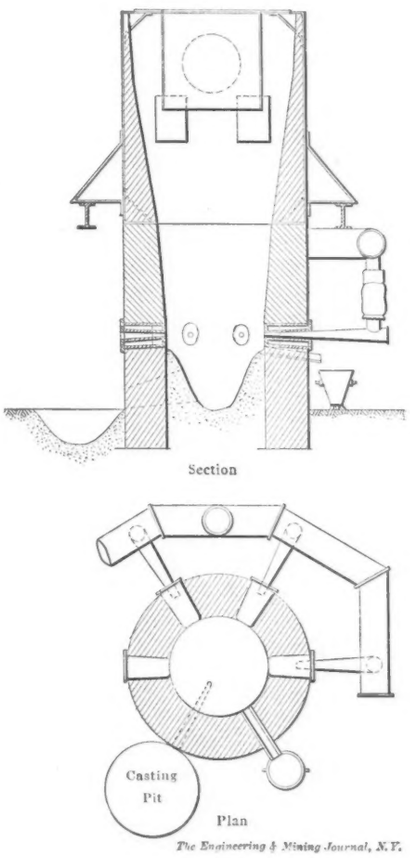
The water jackets are notable for their hight, 2.13 m. Having to work with zinky ores, these tall jackets were adopted so as to enable the use of a high-blast pressure and to facilitate the removal, from above, of the accretions, which form most abundantly on the upper part of the jackets, accretions being much more easily detached from a metallic than from a masonry surface. The jackets were made in such a way that there are no rivet heads on the inside surface. The inner ends of the tuyeres were expanded against the interior walls of the jacket like boiler tubes, but after a run it was found necessary to braze these joints with an oxy-acetylene blowpipe. The jackets are supplied with sea water, and by circulating large volumes of it, so as to maintain an escaping temperature of 50 deg., no difficulty is experienced from the deposition of salt.

Wall Accretions

Wall accretions, working with an air pressure of 1.75 to 1.95 m. of water, are



CRUCIBLE OF NEW FURNACE



OLD LEAD FURNACE

generally formed around the top of the jackets and within a distance of 0.8 to 1.0 meter above them. They contain 30 to 40 per cent. zinc, 15 to 20 per cent. lead, and are usually sulphides. Higher up in the furnace they contain as much as 60 per cent. zinc and very little sulphur.

A sample of these accretions taken just above the top of the water-jacket gave: Zn, 32.25 per cent.; Pb, 16.90; S, 12.23. One taken 1.5 or 2m. above it contained: Zn, 57.05 per cent.; Pb, 16.00; S, 2.75 per cent.

Method of Charging

The sheet-iron flue is fastened rigidly to the roof, but the hood, to which the flue is connected by a flexible collar, is hung on hinges in such a way that it can be swung entirely to one side, if desired, to facilitate the barring down of accretions. On each side of the hood are four balanced doors which open automatically when the charge is dumped from the cars and close when the car is withdrawn. The draft is generally sufficient to prevent the escape of fumes, but a fan, run by electric motor, is placed in the flue to render occasional assistance. The temperature of the gas in the hood varies from 40 to 60 deg., and water frequently condenses on the inner walls. Such dust as does escape is rich in arsenic, but carries very little lead.

The usual charge consists of 4800 kg. of ore and 624 kg. of coke. The coke fills four cars, each of which is twice as long as an ore car, and is dumped in advance of the ore, which fills eight cars. Results of an attempt to double the size of the charge were discouraging.

The Air Blast

Blast is supplied by two Root blowers, independently driven by two gas engines. One blower is held in reserve. Each engine, when operating, consumes 100 to 120 h.p. and delivers 350 cu.m. of air per minute at a pressure of 1.75 to 1.95 m. of water. This comparatively high pressure insures complete fusion of the ore, while the hight of the charge, 6 m., prevents escape of undue amounts of dust. A pressure of 2 m., or more, did not afford a proportional increase in the output and overheated the upper part of the furnace.

The furnace has 10 tuyeres on each side and one at each end. The best results are obtained by closing the end tuyeres, and using only the 20 lateral tuyeres. The construction of a tuyere is shown in an accompanying figure. Additional cast-iron thimbles can be placed inside the point of the tuyere so as to produce a greater velocity of air current. At Laurium, experience shows that an internal diameter of 90 mm. gives the best results with the pressure used. Each tuyere has a valve by which it can be shut off. On the main air pipe also, is a gate having behind it a safety valve to which it is connected by a chain and pulley, so that the action of the two is simultaneous. If the gate has to be closed quickly, the safety valve opens and prevents excessive pressure in the air main.

Tapping Slag, Speiss, Etc.

When the furnace is smelting 250 to 300 tons of ore per 24 hours, the slag flows constantly, except during necessary cleaning of the discharge spout, which occupies 15 or 20 min. per day. All the waste

products discharge from one of the ends of the furnace. It would naturally be supposed that, discharging in this way from such a long furnace, the flow of slag would not be regular, but it has always been found to be so at Laurium, and the descent of the charge has always been remarkably uniform. The waste products flow through a water-cooled bronze spout having an internal diameter of 70 mm. They then flow to a fore-hearth through a water-cooled trough 2.3 m. long.

The fore-hearth is of large dimensions, its capacity being 3 cu.m. It is lined with manganese-chrome brick and can be cooled by water. It is mounted on a truck of 1.8 m. gage. The whole apparatus, in working order, weighs 30 tons. The fore-hearth was built on these large lines so as to minimize the influence of sudden changes in the working condition of the furnace. The hearth is emptied through the bottom, and from 3 to 5 tons of matte and 7 to 9 tons of speiss are drawn off once in 24 hours, or occasionally only once in 48 hours. The slag flows off continuously from the top into a trough of running water and thence, in granulated form, into one of two cars, carrying 8 tons each. Four workmen per 24 hours attend to the disposal of all the slag, matte and speiss derived from the smelting of 300 tons of ore. None of the slag is returned to the furnace. By making the fore-hearth of large dimensions it is possible, in case of repairs to the furnace, to let the charge stand in the hearth for 24 hours without danger of freezing.

COMPOSITION OF WASTE PRODUCTS.

	Slag.	Matte.	Speiss.
	Per Cent.	Per Cent.	Per Cent.
SiO_2	25.20	.....	.....
Fe	23.24	40.00	50.00
Al_2O_3	11.38	.....	.....
Mn	2.24	.....	.....
CaO	17.33	.....	.....
MgO	trace	.....	.....
S	0.78	20.00	.....
Zn	9.87	12.70	.....
Pb	0.80	11.00	3.00
O of the bases	9.71	.....	.....
As	.....	.....	33.00
Ag (grams per ton)	10	.....	150

Casting the Lead

The lead flows continuously through one of two siphons on one of the long sides of the furnace, the other siphon being held in reserve. The overflow level of the lead varies from 14 to 20 cm. above that of the slag discharge, depending upon the pressure employed. The lead flows through a cast-iron spout into a steel kettle holding 2500 kg., where it is cooled and skimmed before running, automatically, into molds, making pigs of 45 to 50 kg. each. Analysis of this lead gives the following composition: Bi, 0.42 per cent.; As, 0.8; Sb, 0.25; Cu, 0.38; Pb (by diff.), 98; Ag. (gm. per ton), 1500; Au (gm. per ton), 4.

Efficiency of the Operation

Working with a blast pressure of 1.75 to 1.95 m. of water, the furnace regularly smelts 250 to 275 tons of ore per 24 hours. With a slag richer in iron the capacity might readily exceed 300 tons. Its operation requires the services of 36 men per 24 hours of whom 12 work on the furnace floor, manipulating and disposing of the slag, speiss and matte, tapping and weighing the lead, and 24 work on the charging floor. The total expense for labor is 1.30 fr. per ton smelted.

The yield averages 90 per cent., which, considering that the charge contains about 11 per cent. lead, means a loss of only one unit, which is not disgraceful in view of the refractory nature of the ore. The slag carries 0.7 to 0.9 per cent. lead. The consumption of coke amounts to 14 per cent. of the ore. Compared with the old furnaces at Laurium, the present plant shows a reduction in every item of expense, and as to its technical aspects, affords extremely satisfactory results.

Mining Conditions in Nicaragua

Special Correspondence

The Atlantic Coast of Nicaragua is one of the most promising mining regions of the world, but its exploitation requires plenty of capital and theoretical as well as practical knowledge. The northern part of the coast contains many producing mines, as quartz mining followed directly the working of placers. For the south, however, the geological conditions are better, but the quartz has not been developed on account of the fact that the placers were worked out years ago by the aborigines, who also took the rich croppings.

There are quantities of low-grade gold, copper and silver ore, plenty of water during 10 months of the year (120-in. rain fall) and sufficient timber. The mining laws are more liberal than those of Mexico, or the English possessions, but are not stable. On this account, people investing a large capital must count on a high rate of return.

Taxes and Duties High

Established mines (not prospectors) import machinery, cyanide tanks and such supplies as cyanide, lime and soda duty free. Provisions and similar supplies are subject to high duty, prohibitive in some instances. Dynamite should be free according to the constitution and the mining code, but it is sold by a monopoly which supplies a poor quality at high price. Some of the mines import their own dynamite by paying heavy toll to the monopoly.

A mine acquired under the mining law has a perfect title, which is always secure, providing the taxes are paid. This tax amounts to $2 per hectare per year. Concessions are not safe, being contrary to the constitution and subject to annulment at any time. There is a strong feeling against concessions, both among natives and foreigners, and the government will some day be forced to call them all in.

Diamond drilling has not as yet been introduced in this district. Through the use of such a drill on undeveloped ground, I believe that many good properties could be secured at a nominal price.

Life on the Nicarauguan cost is not congenial, the desert region of the United States being attractive by comparison, and on this account it is hard to get competent men to remain in the country.

Smelting Titaniferous Iron Ores in the Electric Furnace

B. F. Haanel gives some figures (*Canadian Engineer*, Aug. 13, 1909) on the experimental run of iron ore high in titanium at the Welland plant of the Electro-Metals Company. The ore was from Wyoming and contained as high as 2 per cent. TiO_2. The principal figures relating to the run are as follows: Length of run (deducting stoppages), 22 hours, 45 minutes; mean volts on furnace, high-tension side, 10,800, low-tension side, 35.6; mean amperes on high-tension side, 25; power factor, 0.91; power used, $\frac{10{,}800 \times 25 \times 0.91}{746} = 329$ h.p.; pig iron obtained, 3317 lb.; output of pig iron per 1000 electrical h.p. days, 5.04 short tons; electrical h.p. years per ton of pig iron, 0.543.

The analyses of the iron ore, charcoal, lime, slag, and pig iron produced have not yet been made by the chemists of the mines branch; but some analyses made in the laboratory of the Electro-Metals Company, Limited, of Welland, show that with a charge containing 35 lb. lime only a trace of iron was found in the slag, and that the iron content of the slag increases with the increase of lime.

In the runs containing 50 lb. of lime the amount of slag produced was large. In future runs on this ore, however, the amount of lime per charge will be reduced to 25 lb., which, it is calculated, will greatly reduce the amount of slag.

The lime was only reduced to 35 lb. in runs preceding or after Mr. Haanel's visit. The charges used were as follows: 10 charges containing 200 lb. iron ore, 60 charcoal, 50 limestone; 3 containing 200 lb. iron ore, 65 charcoal, 50 limestone; 22 containing 200 lb. iron ore, 70 charcoal, 50 limestone; a total of 35 charges.

Some analyses of the pig iron obtained showed only a trace of titanium.

The output in pig iron per 1000 h.p. days for this run must not be considered as the best result that can be obtained, as the furnace during the first 7 hours of the run operated badly. To arrive at definite and reliable results as to output the furnace should run continuously for at least three days.

Seismic Disturbances and Coal Mine Explosions

A Discussion of the Possible Effect of Seismic Disturbances on the Accumulation of Gas in Coal and Its Extension into the Workings

BY AUDLEY H. STOW*

The possible increase in danger resulting from sudden atmospheric depressions, or from seismic disturbances, will quite probably be a favorite subject of discussion, so long as these interesting but regrettable phenomena termed explosions continue to occur; at least, until it is clearly proved that the increase in danger indicated cannot possibly occur, even under the most favorable conditions. It is not contended that we should relax our efforts in other directions, nor even that a large proportion of all the explosions are due to the influences referred to. Yet it does not appear in line with modern ideas, to disregard a danger, the extent of which is uncertain or unknown. The possible, if not probable, effect of atmospheric depressions, as well as of seismic disturbances, is to increase the volume of gas to be handled underground, and for this reason, these phenomena may perhaps be classed as similar; that there is any direct relation between the two does not at all necessarily follow. One is perhaps but an evidence of the other; and yet, on the other hand, it is also possible that there is not the remotest relation.

Of seismic disturbances, two classes or types more particularly are suggestive of consideration. The first is that form of internal disturbance which results in the flow of lava from volcanoes; the second is that which results in movements of the earth's crust, or more particularly in the movement of the strata on one side of a fault adjacent to mining operations, with respect to the strata on the opposite side.

Volcanic Action

That immense forces must be in action within the interior of the earth, to produce a flow of lava from the summit of a volcano, would appear from a consideration of their hights, in connection with the thickness of the earth's crust. Mt. Vesuvius varies in hight from time to time, within the limits of several hundred feet, the average hight being somewhere about 5000 ft. above sea level. The "American Encyclopedia" gives the hight at 3876 ft. after the eruption of 1845 and 4253 after the eruption of 1868. Aconcagua, however, is given as 23,000 ft. or more than four times as high, while there are other volcanoes also of much greater hight than Vesuvius; so that 10,000 ft. above sea level may be used in illustration of the pressure required.

The thickness of the earth's crust is variously stated. Jukes gives 20 to 30 miles; Recluse 20 to 25 or at most 50 (Humbolt "Studer"); Chamberlin and Salisbury many thousands of feet and probably many miles; Geikie 1 per cent. of the semi-diameter of the earth (Arrhenius).[1] Lava is perhaps but the slag, as it were, which floats on top of the heavier matter beneath, the solid crust of the earth possibly to a certain extent floating in the lava or similar fused matter. It appears a somewhat plausible view that the primary pressure which produces the flow of lava, originates beneath the solid crust of the earth. The more rapid shrinkage of the earth's crust as compared with the molten interior, due to the more rapid rate of cooling, should rather tend to leave open spaces in the surface of the earth; if so, shrinkage would hardly serve to explain the flow of lava from the summit of a volcano.

That the level of the lava, during periods of inactivity, falls far below the top of the crater in instances, would appear to be indicated by the large volumes of steam occasionally accompanying eruptions. The adjacent strata may, during the period of inactivity, become filled with water. The rise of the molten lava through such strata would readily account for large volumes of steam accompanying an eruption.

If we attempt to estimate the primary pressure which produces the eruption, from the hight of the column of lava supported, it is then of interest to consider the probable minimum hight above or below sea level of the lava, during periods of inactivity. As the specific gravity of lava is 2.5, a given column would be equilavent to 2.5 times this hight of water. If previous to the eruption, the lava had stood at sea level, a volcano 10,000 ft. in hight for instance would represent a water column of 25,000 ft. If previous to the eruption, the level of the lava had stood at 30,000 ft. below sea level, or less than 6 miles, we would thus have 100,000 ft. as the equivalent water column; 150,000 ft. below sea level, less than 30 miles, would correspond to 400,000 ft. of water. The corresponding pressures in atmospheres would be approximately 730, 2940, and 11,760 atmospheres respectively.

Dana's "Geology" gives a list of over 500 volcanoes; there being, in addition, many districts in which the number of volcanoes is not known, or at least not stated. There are in all perhaps somewhere between 700 and 1000 volcanoes that have been at one time or another in action. Judging by their wide distribution, the ebb and flow of pressure represented by inactivity and eruption, must have occurred in many quarters of the globe, during long periods of time.

It is, however, hardly clear in what manner even the maximum pressure could directly affect the amount of gas encountered in mining. Were coal mines in the close vicinity of volcanoes, there might possibly be some direct connection; coal mines, however, are usually far removed from regions of volcanic activity. That the seismic disturbances which result in eruptions may not, however, under certain conditions, indirectly increase the quantity of gas to be handled underground, is not altogether clear.

Movements of the Earth's Crust

The gases encountered in the advance work result perhaps in large part from the slow or gradual distillation of volatile hydrocarbons, due to the heat in the interior of the earth. The strata adjacent to the coal seams often also contain much carboniferous matter. If this possible view is correct, it is not difficult to understand why the resultant pressures may be considerable, perhaps sufficient to force the gases long distances through open-grained sandstones, for instance. The gradual escape of the gases, in this manner, will reduce the initial pressure; yet the pressure incident to their passage should still leave a considerable pressure at the point of origin. A vertical or steeply inclined fault or fissure may pass through such strata, the foot-and-hanging-walls, however, being in such close contact that no gases can escape through the fissure. Under these conditions, mining operations in close proximity to the fault may be seriously endangered by seismic disturbances. Such a movement of the walls of the fault as would perhaps escape observation, may still be sufficient to permit large volumes of gas to reach the immediate vicinity of the mining operations, if not the actual open work.

Where there are several faults through strata consisting largely of open-grained sandstones, an obstruction in one fault may simply result in the gas being di-

*Consulting mining engineer, Maybeury, W. Va.

[1]Courtesy editorial staff, A. I. M. E.

verted to some other fault in the vicinity, in which the pressure is thereby increased. If the advance work should then hole into an extremely small crevice leading into any one of the system of faults, a sudden outburst of gas would probably result. The interval of time since the original disturbance might, however, be considerable. Seismic disturbances have perhaps been at least contributory to fatalities that have possibly been accredited by many to coincident atmospheric disturbances, particularly in districts in which the latter are closely observed and recorded.

Such an internal pressure as will support a column of lava perhaps 10 miles in hight, or possibly as much as 50 miles, might easily be sufficient to produce a slight movement of the walls of a fault. If this possible view is correct, the seismic disturbance which produces the flow of lava, may also be indirectly the cause of the sudden outburst of gas; not that the pressure that acts on the lava, actually also exerts itself on the gas, but that the rocks that contain gas under great pressure are incidentally so moved or disengaged, perhaps horizontally instead of vertically, that the pent-up gases below can escape toward the surface.

Varieties of Coal

The heat increases with the depth below the surface of the earth. For the same grade of coal therefore the danger should then increase with the depth. Coals containing high percentages of volatile matter should produce much more gas than anthracite, for instance. Were the gases volatilized, without being allowed to escape, the pressure would in due course be enormous; however, the pressure is probably merely that incident to the resistance represented by their escape to the surface; thus the pressure of gas in the anthracite field of Pennsylvania is perhaps approximately as great as if the coal contained a high percentage of volatile matter. The gas produced by distillation may extend laterally a considerable distance beyond the actual limits of the field, while the greatest pressure should be at the lowest point at which carbonaceous matter occurs which can be volatilized.

Variation in Danger

The danger depends, perhaps, more particularly upon the depth below the surface of the earth, and upon the extent to which the strata are faulted or fissured. If so, the anthracite fields in Pennsylvania may then possibly approximate the maximum danger due to seismic disturbances. On the other hand, bituminous mines in horizontal unbroken strata may represent the minimum degree of danger, particularly if well above water level. Adjacent to West Virginia the well known Abbs Valley fault parallels Bluestone river for quite a distance, and may be said to form the limit of the coal measures in the Flat-top field. Passing northwestward, toward the Ohio river, prospecting at intervals for 20 years has failed to show any indications of faults or fissures, until the little town of Dingess, on the Norfolk & Western railway, is reached, about 60 miles from the Ohio river. About eight miles from the town mentioned, what appeared to be a true fault was found. A 3-ft. seam of coal was sheared at a rather sharp angle, the footwall showing striations or slickensides. No effort was made at the time to determine the throw of the fault, which was not readily apparent.

That the Dingess fault is not of great extent, is probable, as no other indications of faulting have been found in the adjacent country, as far as noticed; the coal seams, however, to the northwest more particularly, are somewhat disturbed. The magnificent Island Creek seam rises about 150 ft. vertically in a short distance, and going in the direction in which it should be dipping about 2 ft. in 100, it then splits into three seams, of about equal thickness. The Island Creek seam also shows the same marked reversion of the dip at another point in the same vicinity, but without splitting. Other indications of disturbances are also found in the vicinity of Dingess. The fault referred to is in line with the Warfield gas belt.

The coal seams along the Abbs Valley fault are more usually well above water level, while in addition, the strata on the opposite side of the fault are fissured in many directions. Even immense volumes of gas, if forced upward, would probably be distributed laterally over a large extent of country. As the seam mined along the margin of the field adjacent to the Abbs Valley fault is in the sub-carboniferous measures of the Rogers Brothers, there is perhaps little carbonaceous matter at great depths below the seam mined. Mining operations in the Flat-top field should perhaps, as a general proposition, represent the minimum danger from seismic disturbances. Were the Dingess fault of wide extent, the danger from seismic disturbances might be an item to be considered, for mining operations in the immediate vicinity: in addition, the seams which in the Flat-top field are more usually above water level, are, in the vicinity of Dingess perhaps 1500 ft. below water level, although the strata are becoming thinner as the Ohio river is approached.

Transpiration of Gas

That a pressure relatively slight as compared with that required to support a column of lava the hight of Vesuvius, for instance, will force gas through the solid coal, is beyond question. The pressure incident to the distillation of volatile hydrocarbons from carbonaceous matter perhaps many thousands of feet below the surface, should also be no small amount. The pressure of gases in the solid has been measured, in a number of instances, the greatest recorded, as far as noticed, being 32 atmospheres.

If the lowest carbonaceous matter is 500 ft. below the coal seam being mined, and if the latter is 500 ft. below the surface, the greatest pressure due to distillation should be that required to force the products through 1000 ft. of strata. We will suppose a vertical fault to pass through the strata and mine under consideration, and that a certain number of extremely small cavities exist along the plane of the fault. If through seismic disturbances, the fault be opened sufficiently to permit the gases at the greatest depth to reach the scene of mining operations, gas should then be delivered in the open workings at a pressure at least approximating that required to force the gas through 500 ft. of solid strata. If, however, the fault did not open directly into the mine workings, the effect would be masked as it were, depending upon the distance. That the sudden outbursts of gas commonly encountered in certain mining districts are perhaps due to seismic disturbances, does not appear at all impossible, under certain conditions.

The foregoing views and opinions quite possibly—or perhaps quite probably—appear altogether untenable to many, if not to the large majority; yet if so, a statement of the reasons therefor would be most welcome, even to one seemingly situated in one of the safest quarters of the globe, at least so far as seismic disturbances are concerned.

International Coal and Coke Company, Ltd.

The report of the International Coal and Coke Company, Ltd., for 1908, shows the net profits to have been $284,211, against $251,049 in 1907. Dividends totalling $182,000, or 6½ per cent. on the issued capital of $2,800,000, were paid, as against $154,000, or 5½ per cent., in 1907. The accompanying figures for the last three years further indicate the progress made by the company.

	1906.	1907.	1908.
No. of men employed	365	465	586
Amount of payroll	$360,874	$437,723	$505,316
No. of days worked	249	236	236
Av. daily coal tonnage	1342	1575	1881
Cost of additions	$ 85,112	$ 45,935	$128,955

The mines and coke ovens of the company are at Coleman, in southwest Alberta, on the Crow's Nest branch of the Canadian Pacific. The coal produced is used chiefly for railway and other purposes in southern Alberta and eastern British Columbia.

The Ferro-Cerium Lighter

In a recent issue of *Annales des Mines de Belgique* (1909, No. 2), Emmanuel Lemaire reports the results of his experiments on the ferro-cerium relighter for safety lamps, which has recently been put on the European market. The only relighter in general use in Belgium is the one consisting of little disks of white phosphorus attached to a strip of paraffined paper. This relighter is perfectly satisfactory from the point of view of safety, but it has the disadvantage of blackening the inside wall of the glass chimney of the lamp, owing to the combustion of the paraffin. An electric lighter, consisting of a coil of platinum wire which is heated to incandescence by an electric current, has also gained some popularity, although it necessitates carrying around a storage battery. Another form consists of a sponge of platinum which is dipped automatically into methyl alcohol, the vapors of which heat the platinum to incandescence, which in turn lights the wick. This method, besides being elaborate, is not altogether reliable under all conditions.

Composition and Construction

The ferro-cerium relighter reminds one somewhat of the old flint and wheel which was the only available means of illumination in gassy mines before Davy's discovery. It consists of a pencil of ferro-cerium, the composition of which is reported to be cerium 70 and iron 30 per cent., which is pressed by a spring against a corrugated steel disk; this can be revolved by a wire passing through to the outside of the lamp. Friction of the steel against the ferro-cerium pencil throws off an abundance of sparks capable of lighting, without failure, the wick of a benzine lamp.

In regard to its mechanical simplicity, this relighter excels all other known types, but some question still remained as to its degree of safety in an inflammable atmosphere. It was feared that some of the incandescent sparks might pass through the gauze of a safety lamp, or that some unburned particles of the ferro-cerium might fall upon the gauze, if the lamp should be overturned, and if the gauze happened to be redhot that the resulting sparks might be dangerous in a gaseous atmosphere. The following tests were made at the Government testing plant at Frameries with a view to ascertaining the safeness of the ferro-cerium relighter. In all tests the relighter was attached to Wolf and to Mulkay lamps.

Tests Conducted

For the first test, the lamps, having single or double gauzes and no hoods, were placed in the testing chamber and subjected to horizontal currents of air containing 8, 9 and 10 per cent. of methane, and traveling with velocities of 3, 5, 7, 10, and 12 m. per sec. In order not to allow the gauze to become hot, the gaseous current was stopped immediately after each relighting and as soon as the gas began to burn in the lamp. The gauze was thus always black at the moment of relighting. Not once during 25 tests with double gauze and 800 tests with single gauze was combustion transmitted to the outside of the lamp, although incandescent sparks were often seen penetrating the gauze.

For the second test, the lamps having single and double gauzes and no hoods were subjected to currents of 3, 4, 5, 5½ and 7½ m. per sec. carrying 8, 9 and 10 per cent. of methane. The gauze was allowed to get redhot, the flame was then extinguished by cutting off the supply of air while maintaining that of gas, the normal current was then restored and the flame relighted by the mechanism. The gauze was thus red at the moment of relighting. Results of this test are stated in the accompanying table.

RESULTS OF TEST NO. 2.

Velocity of Current, Meters per Second.	Per Cent. of Gas.	Number of Tests.	Number of Transmitted Combustions.
Single Gauze, Red Hot.			
3	8	75	0
3	9	75	0
3	10	126	1
Double Gauze, Red Hot.			
3	8	25	0
4	8	20	0
4	8	1	1 (*a*)
5	8	20	0
5.5	8	28	5 (*b*)
5.5	8	37	1 (*c*)
7.5	8	55	6 (*d*)
		462	14

(*a*) Several attempts to relight had failed; gauze was almost black.
(*b*) New gauzes.
(*c*) Old gauzes.
(*d*) Inner gauze was heated until the flame passed through the outer gauze.

During the preceding series of tests, the sound of the explosion that occurred at each relighting was distinctly audible, and the soldered joints of the relighter melted frequently.

The third series of tests was conducted with the purpose of ascertaining the danger residing in the unconsumed particles of ferro-cerium alloy which collected, in considerable amounts, particularly on the top of the oil reservoir. It was feared that these particles, if thrown against a red-hot gauze, might penetrate it and cause exterior combustion. The test lamp was mounted on an axle, which could be turned from outside the chamber, in such a way as to tip the lamp upside down and shake it. All tests were made in a current of air carrying 8 per cent. of methane and velocity of 3 m. per sec. After working the relighter a few times, the lighted lamp was put into the chamber in its natural position. As soon as the gauze began to get red, the supply of air was cut off so as to extinguish the flame of gas burning inside the lamp then, after restoring the air current and noticing that the redness of the gauze had disappeared, the lamp was upset so as to throw particles of the alloy against the gauze. Under these conditions, at contact with the black but still hot gauze, the particles would become incandescent, relight the gas inside the lamp, and sometimes transmit the flame to the outer atmosphere. By extinguishing the gas flame as soon as it began to burn and repeating the shaking of the lamp as soon as the gauze had lost its redness, it was possible to obtain as many as 21 consecutive combustions of gas inside the lamp without removing it from the test chamber. In the course of this series, the gas inside the lamp was lighted 148 times, merely by shaking particles of ferro-cerium against the hot gauze, and the fire was communicated 39 times to the outside gaseous atmosphere.

At first, in order to provide the particles of unconsumed ferro-cerium needed for the test, the lighting mechanism was worked as many as 200 times before putting the lamp through the test, but it was later discovered that a single operation would provide enough of the particles, provided that the lamps were carefully cleaned, to yield several combustions of gas in the overturned lamp by repeated shakings.

Binder-Materials Made from Sulphite-Pulp-Waste

By Robert Schorr*

This subject has received a great deal of study and practical attention in Europe for many years, and more recently also in this country. While even a gigantic commercial development in that direction would not wholly solve the serious problem of stream pollution by waste liquors resulting from the manufacture of paper-pulp by the sulphite process, it would reduce the nuisance in many localities where the material could be marketed in competition with coal-tar products, asphaltum or other binders. A glance over the figures as presented in Water Supply Paper No. 226 of the U. S. Geological Survey and in Circular No. 120 of the Forest Service, must impress one with the wide scope of the work, which, in spite of most exhaustive research, has established no important results or remedies.

About half of all wood-pulp is made in

*Engineer, Postal Telegraph building, San Francisco, Cal.

the United States by the sulphite process. In 1906 almost 2,000,000 cords of wood were consumed by it, and yielded over 1,140,000 tons of "dry" pulp. The amount of solid material discharged with the waste liquor per ton of pulp produced varies from 2200 to 2700 lb. Assuming an average of 2500 lb., this represents a total of over 1,350,000 tons of solids for 1906.

Every ton of dry pulp requires about 2285 gal. of acid-liquor and the same amount of water for each of the two washes. The acid application and the first water-wash constitute, as a rule, the waste liquor discharged by the mill. Consequently we had, in 1906, about 1,140,000 $\times 2 \times 2285$ equal to over 5,200,000,000 gal. with over 1,350,000 tons of solids contaminating our waters. These figures are approximate only, as the degree of dilution varies with different plants and equipments. The relation between pulp output and solid waste, however, is more definite. This waste contains 70 to 80 per cent. wood material (ligno-cellulose), 8 to 19 per cent. inorganic matter ($CaSO_4$ and $MgSO_4$) and 8 to 11 per cent. sulphur. This will give a general idea of its character and, as far as concerns our theme, it is not necessary to discuss the complex chemical nature of the organic portion. There is much valuable literature on this subject, foremost being the *Journ. f. prakt. Chem.*, Carl Hoffman's book on Paper Manufacture and the *Papier-Zeitung*.

Utilization of Waste

Numerous processes for utilizing this immense waste have been patented, and, it appears to me, the condensation into pulp-tar or pitch by simple evaporation seems most promising at the present time in a number of States. This statement is made with the knowledge that some of the earlier installations for this purpose have not proved a financial success, but since that time conditions have improved with the progess in the design of evaporators and the increased demand for binder. The cost of adhesives is, in many localities where pulp factories exist, excessively high, and this fact should insure a commercial success in spite of the rather high expense of manufacturing pulp-pitch.

It can be used as a substitute for glues, also as a binding agent for coal, coke breeze, flue dust, ore fines, sand and the like. Although this evaporated extract has been used for these purposes for several years, the most rapid progress was made in that direction during the last year. A number of large German iron works have again abandoned the practice of sintering their fines, and it is reported that they are briquetting them and flue dust with sulphite-pulp-pitch as a binder. Cores for casting are extensively made with it in this country and in Europe.

Commercial Aspects of Pulp-pitch

For the process of evaporating the waste liquor, its degree of concentration is obviously of vital commercial importance, and, to avoid undue dilution, the acid-wash should be kept separate from the water-washes and other drains wherever practicable. The operation is costly even when handling comparatively strong solutions, as large quantities of water have to be expelled to obtain a limited amount of pulp-pitch or pulp-tar. However, in investigating the commercial end of such undertakings the superior adhesive qualities of these materials have to be borne in mind.

The melting point of pulp-pitch is high, and it can be shipped in bulk as it does not soften at ordinary temperatures. The briquets I have made with it fulfil all physical requirements. They ignite readily and as coking sets in they retain their shape, not disintegrating until completely consumed. The briquets are strong but not entirely waterproof. The pulp-pitch does not increase smoke or odor, and, as nearly all of it is combustible, it adds but little to the ash content. Its influence upon the heating value of the fuel is negligible.

The great adhesive power it possesses makes it an ideal binder for mineral substances, both in connection with metallurgical undertakings and also for the manufacture of artificial stone masses. In many cases, however, waterproofing will be necessary.

The installation for the evaporation of waste-liquor is rather expensive, and before designing such a plant it is important to secure an average sample.

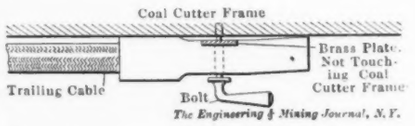
Pulp-pitch sells in Germany for 40 marks, about $10, per ton and the manufacturing cost is said to be in the neighborhood of 25 marks. The evaporating has to be done at a low temperature to avoid charring and excessive losses. In most pulp mills exhaust steam is available for this purpose, or live steam could be cheaply generated by using the large amount of refuse from the barkers and the ¼-in. rejects as boiler fuel. In the latter case low-pressure steam could be made and an exhaust-steam turbine could be operated in conjunction with the evaporators.

An Accident Caused by an Electric Coal Cutter

Special Correspondence

An inquest was held, some weeks ago, at Nottingham, England, concerning the deaths of two men killed by electric shock, on June 28 last, at the neighboring Clifton colliery. There was no doubt as to the cause, which was that the men had touched the case of an electrical coal cutter which had become charged. The coal cutter was supplied with current at 550 volts three-phase (center point not earthed), and the stator winding had come in contact with the case. Evidently there was sufficient earth on one of the other phases to give the fatal shocks. Artificial respiration was tried without success. There was a fourth wire in the trailing cable for earthing the frame of the machine, but the evidence showed that the connection between this and the machine was defective.

R. Nelson, electrical inspector of mines, and W. Walker, district inspector, explained that electricity is used for driving coal cutters in the form of three-phase alternating current at 550 volts pressure. Though the Home Office special rules do not provide for the earthing of coal-cutter frames, nevertheless at Clifton colliery the machine frames were connected to earth by a special wire as a precautionary measure. Connection from the supply main to a coal cutter is made by what is known as a trailing cable—a flexible cable with three or more cores, usually kept in a coil and unwound as the coal cutter recedes from the supply-control switch, fixed at the end of the supply main. At Clifton this trailing cable had, in fact, four cores, the extra or fourth core being for the purpose of providing the earth connection above referred to for the machine frame. The insulation of the wires



EARTHING CONNECTION FOR COAL CUTTER

joining the motor winding had become worn through, probably by rubbing caused by the vibration of the machine in working, and in this way live metal touched the inside of the machine casing; and as the earth connection was imperfect in spite of the fourth wire in the cable, the machine frame became charged to a dangerous pressure.

Taking the failure of the motor winding first, the memorandum pointed out that such a failure through abrasion is uncommon; but periodical inspection of the windings of the motor where any danger exists of abrasion should have disclosed the fault before it became actually dangerous.

The fault occurred in that part of the winding where three wires are led to the motor-control switch. Special attention should, therefore, be given to the substantial support and fixing of these wires, so as to remove the possibility of abrasion at this part through vibration. The trailing cable above referred to was fitted with a wooden plug or pommel containing three sockets, which sockets were designed to fit over three prongs in the coal-cutter motor-terminal box. The earth wire, forming the fourth wire in the trailing cable, was fastened to a small brass plate

on the side of the timber pommel, and connection between this brass plate and the machine frame (upon which the earthing of the latter depended) was made by a 5/8-in. bolt, provided with a lever handle for screwing into the machine frame. In ordinary circumstances these arrangements should provide a sufficient earth, but in the present case an oversight upset them. The brass plate to which the trailing-cable earth wire is attached was fixed on one side only of the pommel, and unfortunately on the wrong side. The result was that the bolt was bearing on dry wood only, so that the earth wire was at least partially insulated from the machine frame. This fact would not necessarily have been fatal had the brass plate on the other side of the pommel been pressing against the coal cutter, but this again was not so. The brass plate stood very little, if anything, above the flat side of the pommel, but in any event the rounded end of the pommel, where the trailing cable entered it, served to keep the plate from contact with the machine frame. This point will be made clear by reference to the accompanying sketch.

To sum up, the recommendations to provide against such an accident in the future are four in number:

1. Coal-cutter motors should be of such design as to admit readily of weekly inspection without introducing the possibility of damage.

2. The wires inside the motor case forming the windings, and especially the end connections, should be substantially fixed and supported, so as to remove the possibility of the insulating material wearing away through abrasion caused by vibration.

3. Machine pommels should be provided with a brass plate all over both sides to remove the possibility of bad connection between earth wire and machine frame.

4. Some easy means—say a few cells and an electric bell—should be readily available for occasionally testing the efficiency of such earth connections as that between a cable pommel and a portable machine frame, so that after overhaul the latter may be left beyond doubt in safe working order.

Coal Mining Method at Kaylor, Penn.

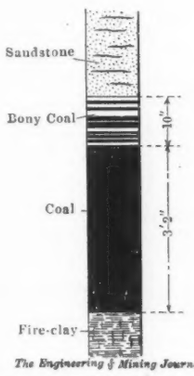
By Edward K. Judd*

The method of coal mining employed by the Great Lakes Coal Company, at Kaylor, Armstrong county, Penn., if not unique, is certainly not as commonly employed as it deserves to be. The conditions at Kaylor, particularly with respect to the roof, are unusually favorable, which may be the reason I have never seen the same method elsewhere.

*Instructor in mining, Columbia School of Mines, New York City.

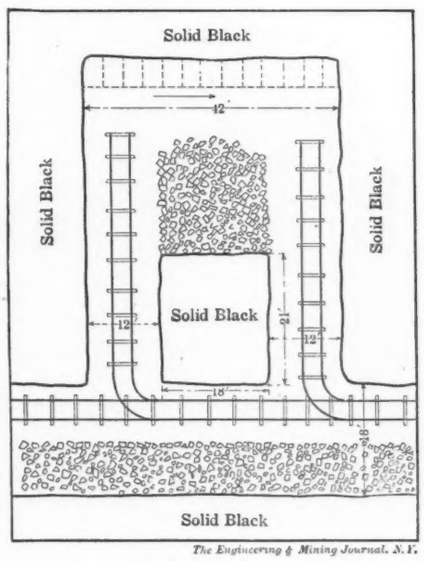
The Coal Seam

The coal in question is the Lower Kittanning seam, which has a total thickness of 4 ft., the upper 10 in. of which is bony coal. The floor of the seam is fireclay, extending downward for at least 8 ft. before it grades into the slate that lies immediately on top of the ferriferous limestone. The roof of the seam is sandstone, lying without any intervening shale directly on the bony coal. The sandstone is fine grained, brownish gray in color, but contains thin partings of carboniferous matter. The stone is exceedingly strong, but when it does break, as it will occasionally, the fracture is sharp and clean and the break will come exactly at the edge of the supporting pillar.



The Engineering & Mining Journal, N. Y.

AVERAGE SECTION OF LOWER KITTANNING SEAM AT KAYLOR



The Engineering & Mining Journal, N. Y.

TWO-NECKED ROOM KAYLOR MINE

Haulage Entries

Haulage entries are driven with a width of 18 ft.; the bottom is taken up for a width of 5 ft. along one rib, so as to give head room for the mules and the electric locomotive; this clay, together with the bony coal, is packed along the opposite wall. This method obviates extra wages for narrow work, the mining and loading of the entry coal being paid for at regular rates, while only $1.57 per yard is paid for taking up the floor to the width of the track. It also avoids handling and hauling the bony coal and clay. Where switches and partings are needed, the entry is left open to its full width, and the roof stands indefinitely, with no intermediate support. The comforts of switching and making up the trips in a wide, clear space, without a single prop in the way, should be seen to be appreciated.

Rooms and Pillars

The rooms are driven with a width of 42 ft., and have two necks, each 12 ft. wide, as shown in the accompanying figure. The stub pillar has a width of 18 ft., and a length of 21 ft. The gob, consisting mainly of the bony coal, is piled up along the middle of the room.

This double-necked arrangement is of great advantage in the operation of the electric-driven chain undercutters. The cutting gang brings its machine, on a self-propelling truck, into a room through the left-hand opening, sets up the machine, cuts across the face of the room to the right in 13 cuts, loads the machine on its truck, which meanwhile has been brought around, and withdraws through the right-hand opening. This obviates the necessity of sliding the cutter back again to the point at which it started, which is a laborious operation, and it also permits the mining gang to come in with their car, set up props, bore holes, and even begin to mine the coal before the cutting gang is out of the room, and without interfering with them in the least. As a result of this saving of time, a good pair of workmen with a chain machine can undercut the coal in one entry heading and six rooms per shift, yielding an output of 125 tons. The average room yields about 19 tons of run-of-mine coal for each cut of the machine.

In the late coal-mine accident at Tollerville, near Trinidad, Colo., in which nine men were killed by an explosion, the Cedar Hill Coal and Coke Company was exonerated from blame, as it was shown that the men had been told by Superintendent E. D. Fisher that there would be no work that day. The men, of their own volition went down into the mine to clean out their rooms and make ready for next day, and were killed while going down in the cage.

Consul William Coffin, of Tripoli-in-Barbary, reports that a party of French engineers are said to have discovered phosphate deposits in Tripoli, but they cannot be profitably worked without constructing a railway to the coast. If such deposits exist in sufficient quantity to attract foreign concessionaires, that would be the entering wedge for the development of the interior, which has been practically closed to foreigners.

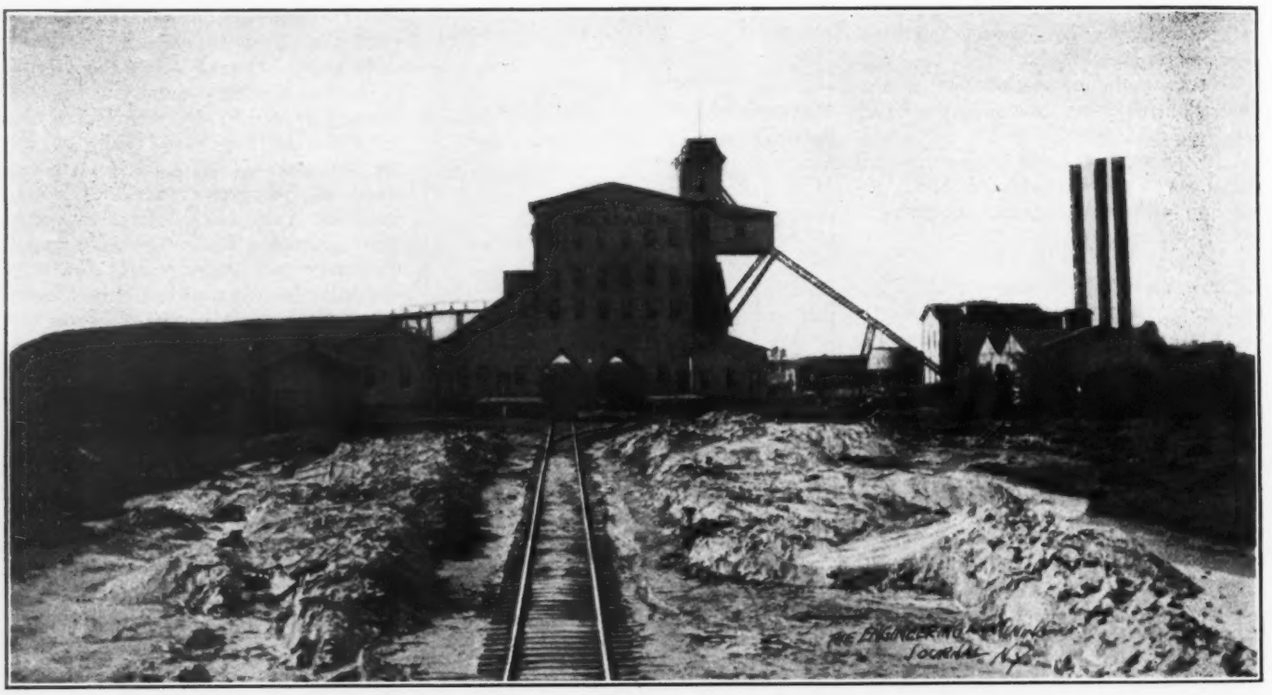
The Rock-salt Mining Industry in Kansas

Beds of Rock Salt Discovered in 1888; Fourteen Seams with Total Thickness of 300 Feet. The Mining and Milling Methods Employed

BY SAMUEL AINSWORTH*

The salt industry of Kansas has been growing steadily during the past 20 years. The mines and evaporating plants of the State have been described briefly in some of the early Kansas agricultural reports. The geological survey of Kansas, under the supervision of Prof. Erasmus Haworth, has made several reports including descriptions of the Kansas salt deposits and industry, the best of these being the one made by M. Z. Kirk, in 1898.

Salt is obtained in Kansas by evaporation processes and by mining rock salt. The evaporated salt business has been largely developed in Hutchinson and evaporating plants are far more numerous than rock salt mines. This paper, however, will deal only with the rock salt mines.



PLANT OF THE BEVIS ROCK SALT COMPANY, LYONS, KANSAS

History

The Kansas salt industry was commenced in the early '60's and the first salt produced came from the Tutle marsh, in Republic county. This salt was an impure grade but at that time it brought a high price. Salt was afterward produced from numerous salt marshes over the State but the large Kansas salt beds were not found until about 1887. Several brine wells were located at Solomon City and a solar evaporating plant was operated there from about 1868 until a few years ago. In 1887 and 1888, the large Kansas salt beds were found while drilling for oil and gas in Ellsworth, Lyons, Hutchinson, Great Bend, Kanopolis, Sterling, Kingman, Anthony and Wellington. The salt bed in all of these drill holes was found to be from 50 to over 400 ft. thick. Various shafts were started at this time, but lack of mining experience and funds caused most of them to be failures.

In 1888, the Kingman Salt Company put down a shaft 4½x8½ ft. and operated a mine for two years, when the company failed and the mine was allowed to fill with water. A shaft 14x16 ft. was put down at Kingman in 1890, but in 1893 the company failed. Nine years later, the mine was pumped out and reopened. This mine has operated since then and a large amount of salt has been taken out. In December, 1908, the mine buildings were destroyed by fire and at present the workings are filled with water. The condition of the shaft and of the mine in general make it improbable that the mine will ever be operated again. Only three other salt mines in Kansas have ever produced salt to any extent and they are: the Bevis Rock Salt Company's mine, at Lyons, and the mines of the Royal Rock Salt Company and the Crystal Rock Salt Company at Kanopolis.

Two shafts have been put down at Lyons to the salt bed, one by the Bevis Rock Company in 1890 and the other by the Midland Rock Salt Company in 1892. The Midland Rock Salt Company reached the salt bed, but failed financially and no salt was ever hoisted. The Bevis Rock Salt Company commenced to hoist salt in 1890 and has been in operation continuously up to the present time. At Kanopolis, two shafts have been put down, one by the Royal Rock Salt Company in 1891 and another by the Crystal Rock Salt Company in 1908. The former company has worked only part of the time, but at present the mine is in operation. The Crystal Rock Salt Company has been operating about a year. Shafts have also been started at Ellsworth, Marquette and Little River, but

*Lyons, Kansas.

all have been failures. At Ellsworth, an artesian flow of salt water was struck and the work had to be abandoned. At Marquette, lack of mining experience and funds caused a failure; at Little River, lack of capital and failure to handle water caused operations to stop when the shaft was only 100 ft. deep.

Geology

The salt marshes of northern Kansas probably obtained their salt from the salt-bearing shales of the Dakota formation. The first salt produced in Kansas was from this source. These shales were easily eroded and thus produced the low marshy areas found in northern Kansas. In the southern part of the State there is some doubt as to the origin of the marshes, but it is evident that the salt comes from the Red beds or the Dakota salt shale.

The large rock salt beds of Kansas are in the Permian formation, with the Marion group of limestones and shales below, and the Wellington above. Only the eastern limit of the bed is known and how far it extends west, north and south has never been ascertained. We know, however, that it extends across the State north and south and is at least 70 miles wide.

The salt bed is thicker in the southern portion of the State. At Kingman and Anthony it is over 400 ft. thick; at Hutchinson, it is 380 ft. thick; at Lyons, about 275 ft. and at Kanopolis, 230 ft. thick. The separate salt seams are thicker to the north of the field, however, and there is less shale in the bed than there is in the southern end. The inland sea from which the salt was deposited was evidently filled up at different periods by an inflow of water from the south. There is no water within several hundred feet of the salt bed and this fact shows that there has been no earth movements since the salt was deposited.

Bevis Rock Salt Company, Lyons, Kansas

The shaft of the Bevis Rock Salt Company was sunk and the plant constructed by Jesse Ainsworth, in 1890. The shaft is near three railroads, in about the center of 4000 acres of salt land controlled by the company. Permanent hoisting engines, air compressor, boilers and brick power buildings were erected before active sinking operations began.

Shaft Sinking—The shaft has two hoisting compartments, 6x7 ft., and one ventilating compartment, 3x7 ft., inside dimensions. To secure the shaft's mouth and to support the head frame, a stone and concrete foundation was first put down. The timbering in this shaft is the "skin to skin" method. The first 30 ft. were timbered with 6x6 in. timbers, the ground being hard clay free from water. The next 30 ft. were sandy clay, yielding a large amount of water. Since there were about 300 ft. of soluble material below, it was necessary to shut this water out of the shaft. At this point the shaft was enlarged to allow for an outer curbing, an inner curbing and puddling between the curbs. The outer curbing was carried down through the water stratum and held in place by temporary buntons. An inner curbing was then built up from the bottom of the shaft and the space between the outer and inner curbing filled with cement; in this way a water-tight wall was formed all around the shaft. During this work the water was led into the shaft by means of a number of pipes placed through the timbers, and pumped out of the shaft. No water has ever leaked into the shaft in the 19 years it has been in operation. There is some seepage water at the 300-ft. level and a water-ring was put in. This water-ring has to be pumped out about once or twice a week. When the shaft reached the salt bed it was enlarged, the inside dimensions being 17 ft. by 8 ft. 8 in. This was done to allow for an inner curbing and puddling, in case it should be found necessary to keep water away from the salt.

Mining—Fourteen workable seams of salt were passed through and the company decided to work an 18-ft. seam near the bottom of the deposit. The entire depth of the shaft as it now stands is 1075 ft. There is a 10-ft. sump, but no water has ever been hoisted from the mine. The shaft was constructed in 299 days counting all delays.

From the bottom of the shaft, two main headings are driven and rooms are driven from these. The regular room-and-pillar system of mining is used and the pillars are left permanently. The rooms are 50 ft. wide and 17 ft. high. These rooms are driven parallel to each other and crosscuts are driven every 75 ft., thus leaving a solid pillar 50 ft. wide and 75 ft. long. No timbering is necessary in this mine and the old workings, as well as the new, remain clear of falling rock.

In mining rock salt a heavy type of machine pick is used, and the salt is first undercut to a depth of 3½ ft. The drilling is done with compressed air auger-drills and 5-ft. holes are put in. A 20 per cent. nitroglycerin powder is used and all the holes in a room are fired simultaneously by electricity, often breaking 500 tons in one blast. The salt is then loaded into mine cars and hauled to the shaft by mules. The salt seam mined is uniform in thickness. A small amount of it is left as a floor and about one foot to eighteen inches is left as a roof. Thus the mine has a solid salt floor and roof and there is little chance for shale to get into the salt. About three acres are mined out each year.

Mills—The mine has duplicate mills, both being used only when trade demands a large output. These mills are set at right angles to each other, and a description of one will suffice. The salt is dumped into a hopper and passes through a set of 24x30-in. toothed rolls. There is a set of movable bars over these rolls and the large lumps can be sent over the crusher to a lump chute where it slides down to the ground floor of the mill ready for the railroad cars. The salt that passes through the first set of rolls falls on a shaker containing two screens. Three sizes of salt are obtained from this shaker; the oversize goes to a set of 34x20-in. corrugated rolls. After the salt passes through these rolls it goes to a pair of shakers and from these shakers it passes to bins by means of elevators and chutes. Fine salt is made by regrinding the coarse salt in a cyclone crusher. There are numerous sizes of screens in the mill and seven different sizes of salt can be made. This mine has a capacity of over 700 tons per day of ten hours, but at the present time the demand is small and about 250 tons are hoisted daily.

The Royal Rock Salt Company

The Royal Rock Salt shaft was constructed by James Cowie, Sr., in 1890. The shaft is near two railroads and is about a quarter of a mile from the town of Kanopolis. When the mine was opened it was well timbered but remained idle for a number of years, and during that time water was allowed to go down the shaft into the mine. The salt was dissolved from behind the timbers and for this reason the shaft had to be retimbered at a large expense. As the shaft now stands water is pumped from a water-ring on the 210-ft. level. No water runs down the shaft to the salt area. The present shaft has two hoisting compartments, 5½x6½ ft., inside dimensions and an air shaft 8x6½ ft. The mine is 803 ft. deep and the seam of salt mined is 9 ft. thick.

The main headings in this mine are driven north and south and are 40 ft. wide. The mine is worked similar to the Bevis Rock Salt Company's mine, but no undercutters are used and the salt is blasted off the solid. There is a dip to the northeast in one part of the mine but this dip is not great enough to hinder haulage.

Mill—The mill of the Royal Rock Salt Company is single, and seven sizes of salt are made. These grades are the same in size as those made in all Kansas rock salt mills. The salt, when hoisted, is dumped on a set of grizzlys and the fine salt passes through to a shaker. The large lumps are fed through a pair of 24x30-in. toothed rolls. From these rolls

it is fed directly to a second pair of toothed rolls, set closer together, and from these rolls it goes to three five-screen shakers, The shakers in this mill are narrower than those used by the Bevis Rock Salt Company. The salt from these shakers is stored in bins where it can be loaded directly into railroad cars. The mill has a capacity of about 250 tons per day.

THE CRYSTAL ROCK SALT COMPANY

The shaft of the Crystal Rock Salt Company was constructed by James and George Cowie. The mine is about ¼ mile southwest of the Royal mine. The shaft has three compartments, the inside dimensions being 6½x18 ft. Two of the compartments are used for hoisting and the third is an air shaft. The shaft was timbered down to the water level with heavy timbers.

A large boiler-iron drum, the size and shape of the shaft, was driven down through the water-bearing sand. This drum has brackets on the inside and is timbered so that there is no danger of its collapsing. It was driven into an impervious seam of clay below the water. The shaft was carried down from the bottom of the drum and timbered with pine timbers set "skin to skin". Two other water-bearing strata were found and the water-ring was put in at 300 ft., where the water is collected and pumped out at intervals. The shaft is 800 ft. deep and the same seam of salt is mined that is worked by the Royal Salt Company. This mine has only been in operation about a year and the workings only extend a few hundred feet from the shaft.

The mining operations here are the same as in the Royal mine. Electric drills were tried but they did not prove satisfactory and compressed air auger-drills are now used.

The mill of the Crystal Rock Salt Company is double, but the mills are not separated as in the Bevis Rock Salt Company's plant. One mill can be run alone only when all the hoisting is done on one side, the other cage running empty. The two mills are both alike and are set side by side, the same engine running both. Each of the two mills are the same as the Royal Rock Salt Company's mill, the only difference being that the machinery is more compact in general. The mine is equipped with self-dumping cages. About 600 tons of salt can be crushed daily, with both sides running; at present only one mill is used and about 250 tons of salt are ground daily.

The growth of the Kansas rock salt business is slow. At no time of the year is the demand so great that the present mines could not supply it. In fact two salt mines could easily supply the demand. There is no fixed price obtained for this salt and the rock salt companies bid against each other for contracts. The Kansas rock salt is quite pure, samples taken from the bins of the various mills averaging over 98 per cent. sodium chloride. The impurities however are dark in color and for this reason rock salt is little used for domestic purposes. This salt is used largely by packing houses, stockmen, in making freezing mixtures, by soap makers and by various other manufacturers. There is an unlimited supply of salt in the field and the probabilities are that the production of salt, in Kansas, will increase more rapidly in the future.

The Talc Industry of St. Lawrence County, N. Y.

SPECIAL CORRESPONDENCE

The talc industry is one that is increasing very rapidly in this county. This is strongly manifested by the fact that nearly all of the working mines have been secured by the International Pulp Company. This company has six talc mills, the majority of which are in operation and have a combined output of approximately 300 tons per day. The largest mill has a capacity of 100 tons daily and was constructed at a cost of approximately $300,000. The building is a concrete-steel structure and is equipped with pebble mills for fine grinding.

The Uniform Fibre Talc Company is installing a mill but it will be several months before it is ready for operation. The only other company operating independently is the Ontario Talc Company, which has a mill equipped for 40 to 50 tons per day. The plant is operated by water power and has turbine wheels with a combined capacity of 500 h.p. when the water is at its normal stage. The talc deposits of this district were first discovered thirty years ago by S. C. Potter and D. Minthorn.

The Ontario Mine is eight miles southeast of Gouverneur, New York, while the mill is about nine miles, the additional distance being due to the necessity of locating the mill where water power would be available. The talc deposits occur in a series of gneiss and granitic rocks; the strike is approximately east and west with a dip to the north of about 45 deg. The talc is a white, pure variety, and free from grit. A number of drill holes have been put down which show the thickness of the deposit to be at least 175 ft. in many places. It has been opened by two shafts ¼ mile apart, the deepest one being 350 ft. The Ontario Company has been operating about ten years and is in direct charge of A. A. Potter, who is vice-president and secretary.

GRINDING

The general scheme for grinding talc in this district is as follows: From the mine the raw material passes over a set of grizzlies. The coarse material is then passed through a jaw crusher set to ½ or ¾ in. The crusher product together with the fines from the grizzlies passes through a set of rolls and is further reduced by bur mills. From the bur mills the mineral is transferred by one-ton cars, or other conveying apparatus, to tube or pebble mills where it is reduced to 80 or 100 mesh. Two types of these mills are in use. The first installation was one with the intermittent discharge. A number of these mills are still in operation. They are charged with one ton of material which is ground for 3 to 5 hours and then discharged by removing a cap from one side of the mill. A grating is placed over this opening to prevent the pebbles from coming out. The other and last type is a continuous feed with a continuous discharge and it is claimed to be more satisfactory in every way. This mill is 6 ft. in diameter, 24 ft. long and is lined with porcelain brick. French pebbles are used for grinding.

The fine dust product from the tube mill is removed to a screen or bolting apparatus which is made of silk. This is constructed similar to an octagonal trommel 3 ft. in diameter and 20 ft. long. This yields a product all of which is finer than 100 mesh. The oversize goes back to the tube mills for regrinding. An 80-mesh product is also made by passing the material through a revolving wire screen. The finished product is then sacked in 100 or 200-lb. bags, as desired by the customers. The bulk of the talc is used by the paper manufacturers.

According to a recent consular report, the zinc mines in Hadeland and Hakedalen, Norway, have been undergoing development during 1908. The lead and zinc mines belonging to the Traag Mines, Limited, and the copper mines belonging to the Aamdal copper mines, have been further developed, but little has hitherto been shipped. However, both these companies are now obtaining more capital with a view to extending the output. As regards the former a new process for reducing zinc and lead is being developed, and at the Aamdal copper mines a new concentrating mill has been erected on the Elmore system.

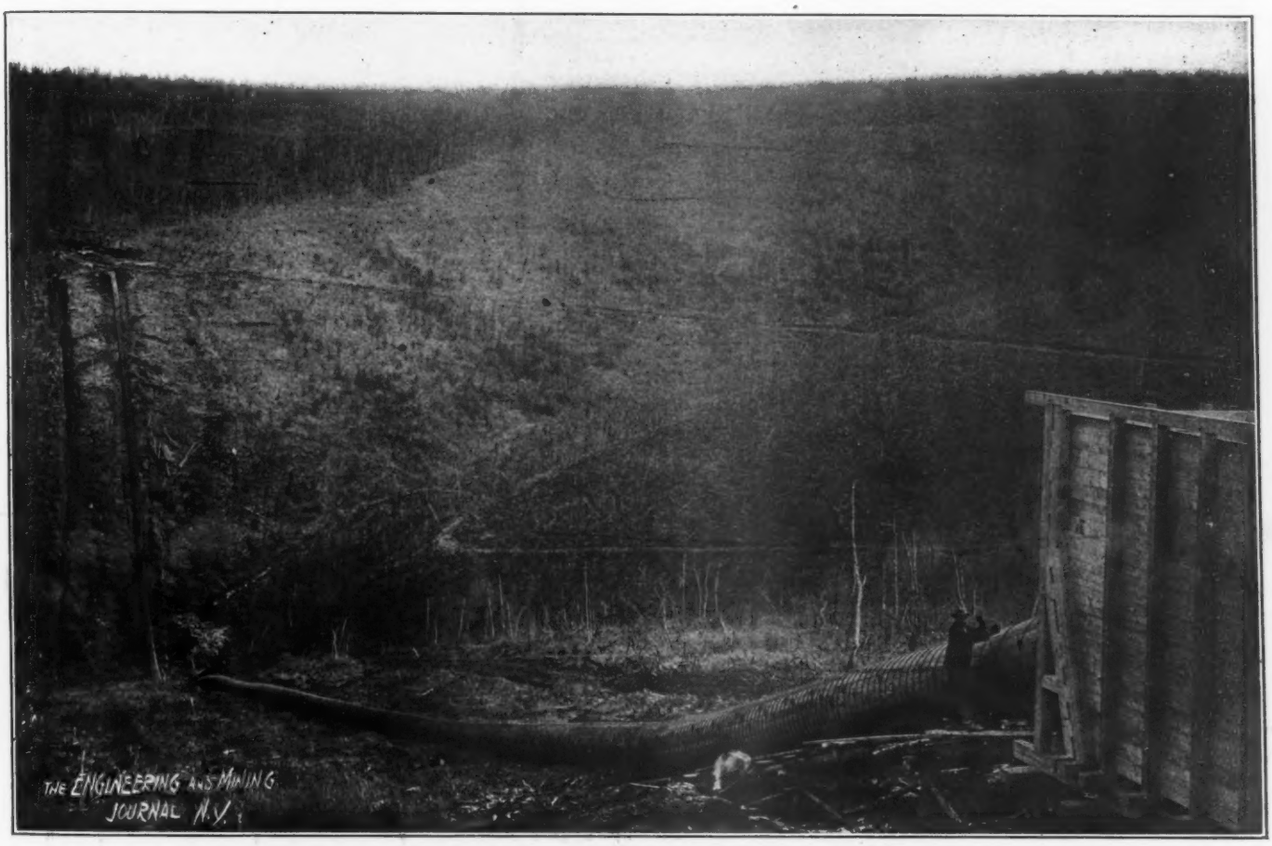
The Holland budget for 1909, as submitted to the Dutch parliament, estimates the profit to the government from mining in the Netherlands East Indies at 21,700,000 fl., or $8,723,400. This includes 18,700,000 fl. from the tin mines of Banka, which are worked by the government, and 3,000,000 fl. from the coal mines of Ombilin, near Padang, on the south coast of Sumatra. In addition to these sources of revenue the government receives a percentage of the receipts of the company which operates the Billiton tin mines.

The Bonanza Ditch of the Yukon Gold Company

Water System Includes 38 Miles of Ditch, 19 Miles of Flume and 12 Miles of Pipe. Three Years Was Required to Complete the Work

BY E. JACOBS

The accompanying illustrations give an idea of the nature of the work the Yukon Gold Company had to do in constructing its ditch, flume and pipe line, known as the Bonanza ditch, from Twelvemile river to Bonanza creek, in the Canadian-Yukon. The Twelvemile is a tributary of the Yukon river. It takes its rise in the part of the Ogilvie mountains, named the Tombstone range, points in which are as high as 7000 feet.



INTAKE OF PIPE LINE ACROSS QUIGLEY VALLEY

The length of this water system is about 69 miles, including 38 miles of ditch, 19 miles of flume, and 12 miles of pipe, the last partly steel and partly stave pipe. The variation in the kind of conduit required was necessitated by the changing topographical conditions. The ditch varies in width, according to local requirements, from 9 to 20 ft. Its grade is generally 6 ft. per mile, but ranges from 4 to 7 ft., conditions necessitating changes from the prevailing grade in places. The depth of water in it is usually about 42 in.; its effective head on Bonanza creek is 375 feet.

Construction work, which included the erection of a steel bridge on concrete piers, to carry the steel pipe across the Klondike river, was extended over the outdoor working seasons of three years.

One photograph shows the steam points used in thawing the ground ahead of the dredges, the company being engaged in dredge mining, as well as hydraulicking, for gold. There are seven electrically operated dredges, the power being generated on Little Twelvemile and transmitted over 36 miles of main pole line and 18 miles of branches. In connection with the hydro-electric generating station, there has been constructed a water-supply system, flume, etc., about 28,000 ft. long, to deliver water to Pelton wheels operating three generators.

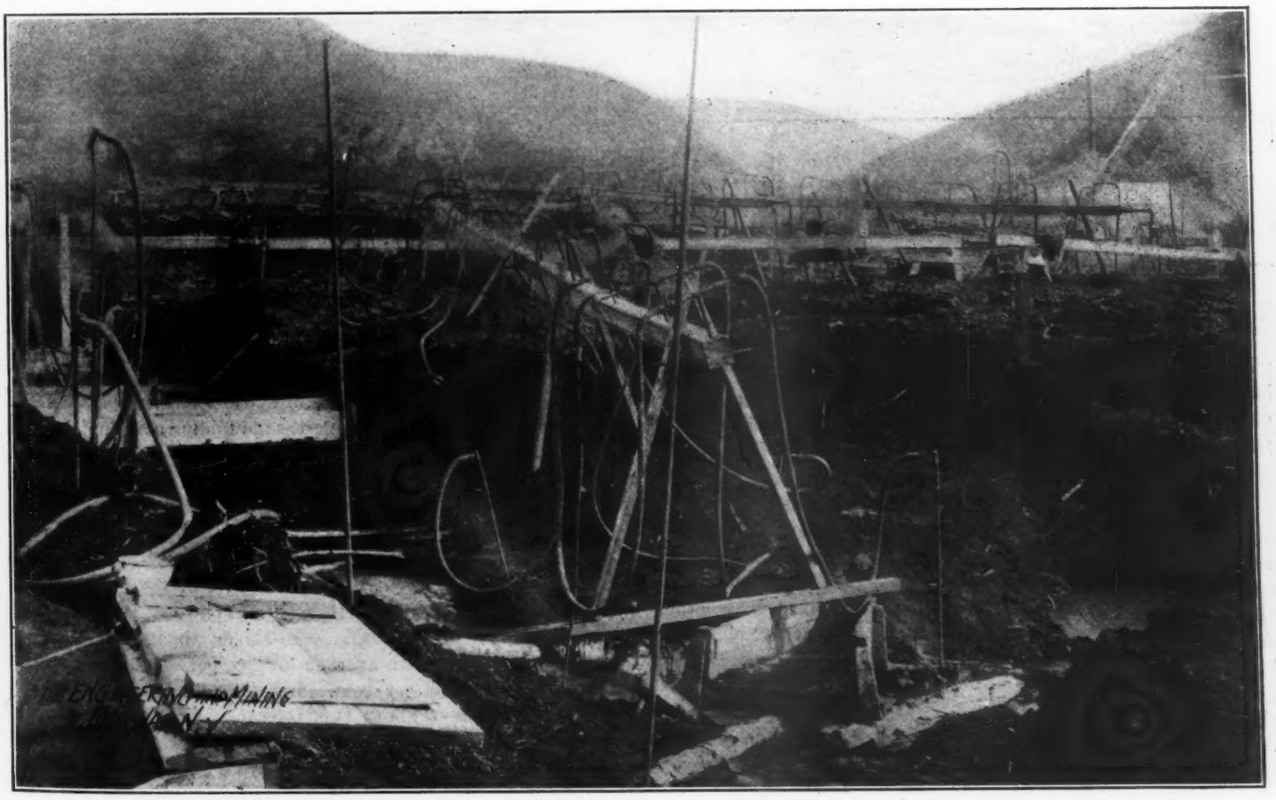
A feature of the company's plant is the three mechanical elevators on Bonanza creek, which are stated to be the first of the kind constructed in Yukon Territory.

In one of the prominent quartz gold mining camps of California recently, a business man failed for $70,000 and, on investigation it was found that a large portion of the indebtedness was to miners. This aroused suspicion, because these miners made no concerted or individual attempt to collect the indebtedness. The result is that these creditors are suspected as "high-graders" though there seems to be no way as yet found to prove it. However, it bears out the assertion made some time since by the superintendent of the most prominent mine in the district referred to, that "the mines of that district were losing about $300,000 annually through the activities of the high-graders."

RIVETING 48-INCH STEEL PIPE WITH AIR HAMMER

LAYING WOOD STAVE PIPE 46 INCHES IN DIAMETER

CONSTRUCTING 4X6-FOOT FLUME



STEAM POINTS THAWING GROUND TO BE DREDGED

The Mining Industry in Algeria and Tunisia

Iron, Lead, Zinc and Phosphates Principal Resources; Labor Low Priced; Little Machinery Used; Operation Handicapped by Governmental Opposition

BY M. CLÈRE*

The last fifteen years have seen the development of French North Africa into an important mining country. This brought about many improvements that would never have been made had the country remained only an agricultural one. Algeria, though much earlier opened to European civilization than its neighbor, seems to have been more handicapped in the race for progress as politics are not allowed to play such havoc in Tunisia as they do in Algeria. Tunisia, however, has been developed rapidly. Railroads are spreading out, new mines are heard of almost every day, and Tunis itself has become an attractive, modern and busy town of 200,000 inhabitants, headquarters for all the mining districts of the interior, and shipping point for most of the ores.

Mining Methods

Mining methods in North Africa are much in contrast with American methods and at first sight might appear antiquated, but generally there is a reason for this. The principal difference between American and Algerian conditions is to be found in the supply of labor. In Algeria and Tunisia labor is plentiful, cheap and efficient. It is composed of Arabs, Italians, Sardinians, and in some places of Spaniards. Wages for miners vary between 2 and 3.5 fr. (40 to 70c. gold), and in many mines the average wage is not higher than 2 fr. There is no danger of a rise in the wages as there is a continuous influx of laborers eager to get a job. This abundance of labor, together with the absence of water power and the high price of coal, explains to a certain extent why machinery is used here only when it is absolutely impossible to dispense with it, and why many surface plants are veritable beehives of men.

Freight rates on ore are generally low and teaming by horse wagons is very cheap as most of the roads are excellent and built after the French fashion. This permits the exploitation of small mines situated some distance from the railroad. In the central part of the country, where most of the mines are situated, hauls of more than 50 km. are seldom necessary to reach either a railroad or a seaport. Some examples and figures will be given later in this article.

A great deal of the concentrating machinery used is of Sardinian make. Sardinians have attained a high degree of efficiency in concentration, especially of lead-zinc ores. They have model plants at Monteponi and Malfidano, and some mines in North Africa are efficiently managed by Sardinians. Crushing, steam and electric machinery is mostly French, American machinery being represented only by the Wilfley tables.

In Algeria and Tunisia, the geological formations begin with the upper Jurassic period. Some Cretaceous rocks are found but the sediments are mostly Teritary. The eruptive rocks are seldom found and only in small, isolated patches. The formations are not favorable to the existence of mineral combustibles except lignites of inferior quality. Copper is scarce, gold and silver are conspicuously absent, and the county is essentially one of iron, lead, zinc and, of course, phosphates.

Deposits of Iron in Tunisia

The exports of iron ore from Algeria in 1907 amounted to 921,441 tons. From Tunisia little was exported as the industry is still new. These exports will no doubt increase rapidly as Tunisia becomes further developed.

In the latter country the most important mine is the Djebel Djerissa, near the Algerian boundary. It belongs to the Company of Mokta-el-Hadid which controls the best part of the iron supplies of North Africa. The ore is a stratified deposit, 40 to 52 m. thick, and contains an average of 56 per cent. Fe. and 2 per cent. Mn. The known reserves are about 15,000,000 tons. The ore is shipped by rail to Tunis and thence to La Goulette, as the harbor of Tunis, lacking wharfage capacity, is reserved for the phosphates. Near the Djebel Djerissa are the Dj. Slata and the Dj. Hameima

MAP OF ALGERIA AND TUNISIA SHOWING MINES

*Mining engineer, 73 Rue des Plantes, Paris.

belonging to the same company and adding about 11,000,000 tons to its reserves. The ore contains 58 per cent. Fe., 1.16 per cent. Mn, and 0.35 per cent. Pb.

Another iron region in Tunisia will in a short time produce iron ore at a high rate. It is called the Nefzas country and is situated between Byzerte and Tabarka. The iron of the Nefzas has been known for many years but difficulties with the government concerning the terms of the concession hampered its exploitation. Now, at last, a railroad is being pushed rapidly from Byzerte to open the country and the mines will be working before long. Some of them belong to Mokta-el-Hadid and others to the Societé des Nefzas. The ores are rich in iron with no sulphur, but some arsenic, varying from traces up to 0.31 per cent. The actual visible tonnage is about 4,000,000 tons. The company will have to pay to the government 5 per cent. of the net product.

Deposits of Iron in Algeria

In Algeria, the Ouenza country, just opposite the Dj. Djerissa on the other side of the frontier, is by far the most important iron region, though it does not yet contain any producers. All this region is highly mineralized, and from the high peak of Djebel Ouenza one may see in the distance the Dj. Djerissa, the phosphate mines of Kalaat es Senam and Kalaa Djerda, the phosphates of the Dj. Kouïf, near Tebessa, the immense iron mountain of Bou Khadra, and many smaller mines.

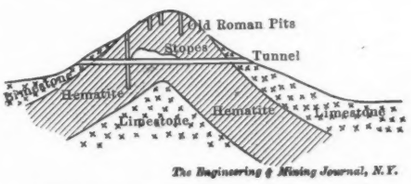
Ouenza is a high mountain, on one side of which outcrops an immense bluff of hematite, absolutely honeycombed by old Roman workings. The hematite is of the best quality, grades of 70 per cent. iron not being exceptional. In places the ore contains also malachite and carries from 2 to 8 per cent. copper. The deposit seems to be a stratified lode between beds of limestone. All the workings are in ore, but I am, however, inclined to the belief that the lode might be a saddle and have a cross section as is shown in the accompanying sketch. Ouenza belongs to the Societé de Ouenza, to Mokta-el-Hadid, and to the Creusot works affiliated with Krupp and other big European steel makers. The Ouenza deposit shows at least between 50,000,000 and 70,000,000 tons of hematite. About 15 miles farther south is the Dj. Bou Khadra, belonging to Mokta-el-Hadid, and those who have seen it are positive that it is as big as Ouenza, if not bigger. There are thus 100,000,000 to 150,000,000 tons of iron ore lying idle and unproductive though there is plenty of capital for its development, because through political influences the government delays the granting of the license necessary to build a railroad from the mines to the seaport of Bona. Such a state of affairs could never exist in Tunisia.

Other big iron mines in Algeria are Ghar El Baroud in the province of Oran, shipping its hematite by the harbor of Beni Saf; Ras el Maden, 21 km. east of Nemours, working manganiferous hematite near the contact between primitive schists and Lias limestones; the Djebel Hadid, near Tenés, working also hematite in lenses; and all the group of Aïn Mokra, near Bona, where the company of Mokta-el-Hadid began and still continues its operations.

Zinc

The exports of zinc ore from Algeria in 1907 were 78,951 tons and from Tunisia in 1906, 27,056 tons. The zinc mines are numerous in North Africa, but they are generally small, though good payers. Most of them produce calamine, only a few reaching the blende zone. The Societé de la Vieille Montagne and the Compagnie Royale Asturienne, both Belgian concerns, are the principal zinc operators.

The biggest zinc producer is probably the Ouarsenis mine (Vieille Montagne) 42 km. southeast of Orleansville. It



PROBABLE SECTION OF THE OUENZA IRON DEPOSIT

works on a calamine deposit outcropping in patches of Lias limestone.

Near Setif are the important mines of Bou Thaleb, in the Lias, and 3 km. northwest of the same town are the mines of Guergour. This company has six mines working lenses of calamine between limestone and slate. A large part of the output comes from surface open cuts but the showing at depth is favorable. The mines produce about 12,000 tons of roasted calamine a year. The ore as it comes from the mines and after a rapid sorting assays about 40 per cent. Zn, and is roasted in ordinary shaft furnaces with 4 per cent. coal to 50 per cent. Zn. It is hauled by horse wagons to the seaport of Bougie, a distance of 90 km., for 22 fr. per ton. Only the lump ore is so treated; all the fines that could not be roasted in the shaft furnaces are stacked in heaps. There are now about 100,000 tons of such fine ore and the company is planning a central concentrator to treat it and also furnaces to roast the fines. Labor is plentiful and the average wage is about 2.5 fr.

Another interesting zinc mine is the Ain Arko property, between Constantine and Bona. It consists of large surface croppings of calamine between limestone and dolomite. At depth the ore narrows and seems gradually to pass into zinc blende. The Ain Arko calamine is especially high-grade, often completely white and sometimes crystallized. After roasting it contains an average of 57 to 60 per cent. Zn. The mine now ships 40 tons of roasted calamine per day, but as soon as the new concentrator is in commission the daily output should be in the neighborhood of 100 tons. The lump ore is roasted in shaft furnaces with 5 per cent. coal at a cost of 35 fr. a ton. A part of the fines is rich enough (4 per cent. Zn.) to be roasted direct without previous concentration. This roasting is done in the Spirrek furnaces which have been already described in the Journal. These furnaces, outside of the difficulty of their erection, are very economical and absolutely automatic, the ore being charged on top through a screen and leaving the furnace at the bottom after falling through the chicanes. The consumption of fuel is 200 kgs. of pine wood for each ton of ore. There is a reserve of over 100,000 tons of ore for the concentrator, assaying 15 to 20 per cent. Zn.

Concentrating at Ain Arko

The concentrator was to be started the day following my visit. It is built to treat 60 tons in ten hours with an expected recovery of 75 per cent. The machinery comes almost entirely from Sardinia and is well uptodate and adapted to its purpose. The ore is delivered from the mines into a large shed where it is to be sorted by boys. The picking belt and the sorting table seem absolutely unknown in this country and sorting and cobbing are done on the ground. The sorted ore is thrown on the grizzly. The oversize goes to the shaft furnaces. The undersize (1¼ in.) falls into a small hopper feeding a shaking perforated conveyer. This machine, of which there are many examples in this country, screens the ore to 12 mm., carries the oversize, and allows some sorting during the transport. The undersize goes to rolls and the oversize to a small crusher and thence to another set of rolls. The crushing is done dry, water being first introduced under the rolls. The ore is sized on horizontal shaking screens, the perforations having a diameter of 10, 7.5, 5, 3, 1.75, and 1 mm., respectively. The ore is jigged on ten 4-compartment Hartz jigs making only hutch products. The beds are made of iron punchings. The middlings are recrushed in a third set of rolls. The ore under 1 mm. is roughly classified by gravity in the pipes leading the stream to the tables. There are four Wilfleys treating the different sizes thus obtained. There is no slime plant. The consumption of water is expected not to

be above 2 tons of clear water per ton of ore. There is a central electric plant with direct-suction gas producers guaranteed to consume only 400 grams of hard anthracite per h.p.-hour, two Winterthur gas engines of 115 h.p. each producing a 220-volt continuous current.

The freight on the calamine is 6 fr. for a 30 km. haul in wagons to Oued Zenati, and thence to Bona by rail, 10 fr. for 151 km. The Ain Arko mine is one of the best payers in the country.

Lead

The exports of lead ore from Algeria were 20,981 tons in 1907, and from Tunisia in 1906, 17,281 tons. Very few mines are worked for lead alone, but many produce lead and zinc. Among them are the Mesloula mine, not far from Tebessa, belonging to the Compagnie Royale Asturienne and producing high-grade galena, and the Djebel Ressas mine, 28 km. southeast of Tunis. The Djebel Ressas mine is situated on a high, isolated, rugged mountain, rising abruptly from the Tunis plain. The deposit is formed by a long fracture in limestones. In this fracture are lenses where the limestone is partially replaced by galena, lead carbonates, calamine and smithsonite, intimately mixed. In other places are veins of solid galena. Almost all the present output comes from open cuts situated on the top of the mountain about 400 m. vertically above the plain and the concentrator. The ore is won by long shots in steps 12 to 15 m. high, is sorted on the spot and sent down in cars over a series of inclines, some of them sloping 45 deg. All this tramming requires a great deal of labor, and it is probable that in America mill holes or chutes would be resorted to, but owing to the abundance and cheapness of labor the cost of the operation is not too high and the ore arrives in the concentrator in a much better condition with a minimum of fines. Mining, sorting and tramming cost less than 4 fr. (80c.) per ton.

Concentrating at Djebel Ressas

The concentrator treats 180 tons of ore per day and in addition there is a production of about 10 tons of lump calamine and galena. The ore sent to the mill assays on an average of 5 per cent. Pb. and 10 per cent. Zn, and contains no silver. It is concentrated to 50 per cent. Pb and about 28 per cent. Zn. The tailings assay 0.30 to 0.40 per cent. Pb., and 5 per cent. Zn. The concentration is not an easy problem as the calamine is low grade and part of it is in the form of a light white hydrocarbonate floating away with the tailings. The mill is elaborately arranged and classification is carried far. Following the common practice in this country there are no sorting tables or belts and no storage bins. This last feature is a characteristic of the mills here. Crushing is done with a strong jet of water playing between the jaws of the rock breaker. The largest size for jigging is 11 mm. and the smallest ½ mm. The jigs make a great amount of middlings to be recrushed and rejigged. Below ½ mm. the ore is treated by Wilfleys and James tables. The slimes generally do not undergo any treatment, though there is a round cement table for rich slimes. The settled water is repumped and the consumption is about 1½ tons of clear water per ton of ore.

Copper

There are a great number of copper prospects all over Algeria but very few mines are in operation and even these are small. The deposits do not seem to have any permanence and play out rapidly. A great number of these copper deposits have gray copper in veins where it is associated with iron carbonate, galena and blende. Such is the Mouzaia mine in the province of Algiers, formerly a regular copper producer and now about to be worked for its spathic iron. Other deposits contain copper sulphides associated with galena and blende. An example of these deposits is the Kef oum Teboul mine, 11 km. east of La Calle. The ledge cuts across the Ligurian slates. This once producing and paying mine is now abandoned, probably worked out.

The Ain Barbar mine, 22 km. west of Bona, works on a vein of cupriferous pyrites mixed with zinc blende. The ore is treated by magnetic separators and in the future will probably be smelted in a smeltery to be built near Marseilles.

Another small producing mine is the Djebel Chouichia in Tunisia near Souk El Arba. It works on copper carbonates in limestone near the contact with a bed of hematite. The ores are malachite and azurite and in some places pyrites and gray copper. Smelting is done in two small round water jackets of 30 tons capacity each. The consumption of coke is 13.5 per cent. of the charge. Coke costs 65 fr. per ton. Generally silicious flux is used but sometimes the mixture of oxidized ores and pyrites smelts readily without fluxes. The slag assays 33 to 50 per cent. SiO_2, and the matte 35 to 50 per cent. Cu. The antimony and arsenic of the gray copper produce a great deal of speiss. All these products are sold in Italy for the manufacture of copper sulphate.

Among the iron mines was mentioned the Djebel Ouenza. This is also a copper mine. The copper is found irregularly in different places in the mine as flakes or leads of malachite disseminated through the solid hematite. The copper zones seem to lie near the contact between the hematite and the limestone and except in one place do not go down far. After a little sorting the ore assays between 2 and 8 per cent. copper. A lixiviation plant was started a few years ago on the banks of the Oued Mellégue, about 4 km. from the mine, but it has not been a complete success. The ore was not crushed sufficiently fine, fuel and acid had to be brought 35 km. from the railroad and were excessively high in price, and the general practice was rather awkward. The tailings assayed 0.75 per cent. copper on an average. It is probable that this plant after being remodeled will be started again when the proposed railroad is completed and the mines worked for their iron.

Phosphates

The discovery of phosphates of lime in French North Africa has marked the beginning of a new era, especially for Tunisia. The exports from Algeria in 1907 were 344,575 tons, of which 78,814 tons went to France. From Tunisia the exports for 1907 were 1,065,343 metric tons. In Algeria the most important phosphate country lies around Tebessa, near the Tunisian border. The tricalcic phosphate is found in beds between shales as footwall and limestones as roof, all belonging to the lower Eocene period.

Three companies are working near Tebessa: the Societé Francaise des Phosphates de Tebessa, producing 40,000 tons a year; the Societé des Phosphates du Dyr, an English concern, with an output of 80,000 tons; and the Constantine Phosphate Co., Ltd., a French company under the same management as the Societé Francaise. This last one produces about 220,000 tons per year. Its mines are called the Djebel Kouif and are situated 28 km. east of Tebessa by rail.

The phosphate beds have in Dj. Kouif an average thickness of 3 m. and a gentle slope of 5 to 8 deg. The ore is won by open cuts when the overburden is not over 12 m . The method of working the beds underground is to take them in two slices by retreating, and then allowing the roof to cave. A miner with three helpers produces 18 to 20 tons per day. The company employs in all 800 to 1000 men for a daily output of 800 tons. The mines are so far completely dry and the ventilation is natural. The ore is hoisted in trains of 1-ton cars through an incline by an electric hoist. The Italian miners are paid by cars and make 8 to 15 fr. a day. Helpers are paid 2.5 fr. The mining cost is certainly under 5 fr. a ton. The phosphate is dried when the weather permits by spreading over large areas. When this is not possible the rock goes through revolving driers, thus reducing the moisture from 8 per cent. to under 4 per cent. The freight to Tebessa over the company's railroad costs about 1.25 fr.; from Tebessa to Bona, over the Bona-Guelma railroad the freight

is 7 fr., and from Bona to European ports by steamer, 8 francs.

In Tunisia the biggest producer is the Compagnie des Phosphates de Gafsa, shipping over 800,000 tons a year from its mines at Metlaoui to the port of Sfax over its own railroad. The company has a capitalization of 18,000,000 fr., and must pay, according to its contract with the government, a royalty of 1 fr. per ton with a minimum of 150,000 fr. per year. The ore assays 60 per cent. phosphoric acid.

Near Gafsa, and belonging to the same company, is the Redeyef property with an estimated reserve of 30,000,000 to 40,000,000 tons.

The Ain Moularés phosphate deposit, 25 km. northeast of Metlaoui, is also another property of the same group. It is not to be worked at present, but is developed and a railroad is built to Sousse for the shipping of the products. The beds are almost vertical and give an average assay of 63 per cent. Estimated reserves are 70,000,000 tons; royalty 1.52 fr. per ton, and export duty 0.50 fr. per ton. The Kalaat es Senam mine, belonging to the Dyr company (Glasgow), and the Kalaa Djerda mine in the same region near the Algerian border, add another 20,000,000 tons to the reserves of phosphate ore actually known. Other deposits are being prospected and some development work is going forward.

Pyrite Mining in New Hampshire

By Albert H. Fay

A promising pyrite deposit is being opened and worked by the Milan Mining and Milling Company, near West Milan, 12 miles west of Berlin, N. H. The mine is ¼ mile from the Grand Trunk railway, where there are loading bins connected with the mine by a tram line. The mine has been worked at intervals during the last 30 years. As the ore carries 2½ to 3 per cent. copper, a small furnace was built and operated several years ago. This, however, was abandoned, and the smeltery dismantled.

The orebody consists of lenses of pyrite overlapping each other, varying from 3 to 10 ft. in thickness. The footwall and hanging-wall are composed of micaceous schist. The orebody dips to the northwest with a strike approximately southwest and northeast. The mine is not thoroughly developed, having only about 400 ft. of work on the first level, and about 100 ft. on the second level, which is 215 ft. deep. A large portion of the ore from the first level to the surface has been taken out. How much farther the ore extends along the strike of the deposit has not been proved.

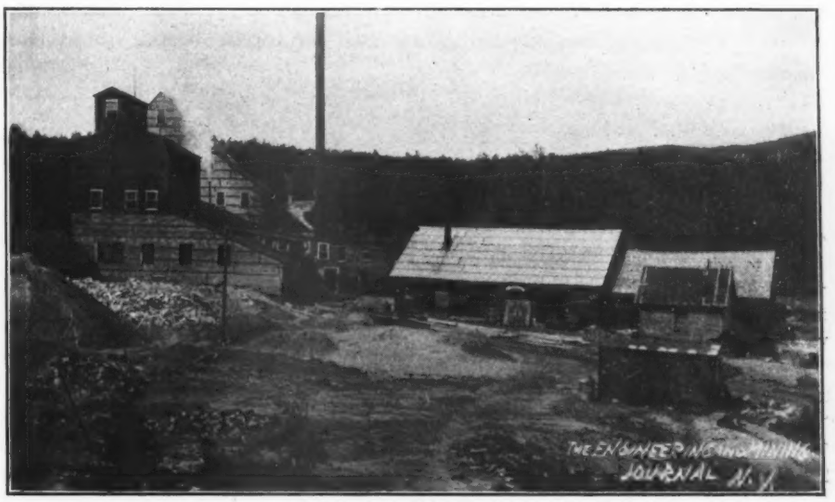
Equipment

The mine is equipped to produce from 50 to 75 tons of ore per day, yielding 25 tons of coarse ore containing 36 to 40 per cent. sulphur, and 20 tons of fines containing 42 per cent. sulphur. Air drills are used, and the mine is lighted by electricity, which is developed at the plant. The mill contains picking tables, crushers, rolls, a Richards' classifier, and all the concentration is made on two Wilfley and three Bartlett tables. The ore is trammed by hand from the mine in mine cars to the storage bin at the railroad station.

Hand Picking

As the ore comes from the mine it is dumped over a grizzly, which consists of 30-lb. rails set inverted, with a space of 3 in. between them. The oversize passes into one bin, and the undersize into a second bin. Hand-picking is conducted on two 24-in. Jeffrey belts. These belts are set parallel with each other, about 3 ft. apart, in order to give ample room for the men to work. As the coarse ore comes from the bin it passes beneath a jet of water, which washes the dust and dirt from it, thus facilitating the work of the pickers. This belt is about 25 ft. long, and travels 20 to 30 ft. per min. The waste material from this belt is thrown into one bin, while the ore is put in another bin. The second-class, low-grade material is placed on the other belt behind the men. The fine ore from the second bin is fed to the belt by an automatic feeder and shaking screen with 1-in. mesh. The oversize from this screen passes on to the belt where a small amount of the best ore is taken off by hand. The undersize goes with the crusher products. No water is used on this belt, as it would interfere with the crushing of the ore and the handling of it in the elevators. The remaining ore on the belt, together with the second class from the first belt, goes to a 11x15-in. Dodge crusher set to 1½ in. This installation has only been in operation a few days, and about 50 or 60 tons per day are being picked on these belts by six men. The larger part of the waste is taken out of the ore before it leaves the mine, so that most of the picking is on shipping and milling ores.

When the ore leaves the crusher it passes through dry rolls 14x36 in. set to ½ in. From here it goes direct to a vibrating Newaygo screen. The screen is double and gives three sizes: 3-mesh, 9-mesh and fine. The oversize from the 3-mesh passes to wet rolls and then back to the screen. The 9-mesh and undersize pass to the Richards' classifier, which yields five products. The largest and heaviest ore goes to the two Wilfley tables. The smaller products are concentrated on the Bartlett tables, each table working at all times on the product from one cell of the classifier. All the tables yield only two products, heads and tails.



PLANT OF MILAN MINING AND MILLING COMPANY, MILAN, N. H.

The production of sulphur ore in this vicinity where the pulp mill business is so large, should be a boon to both industries. At present the pulp mills import their sulphur from Louisiana and other places, and the sulphur ore from this mine is shipped to New York. There is room for a scheme whereby the sulphur in this ore could be utilized by the paper mills in the immediate vicinity.

Vice-Consul-General Carl C. Hansen, of Bangkok, reports that petroleum has been found in Kolantan and other ports of the Malay peninsula. In the north of Siam small quantities of the oil have come to the surface in Muang Fang and other places, but so far no attempt has been made to ascertain its commercial value. It is collected by skimming the water which collects in shallow pits dug for the purpose. The oil is black and viscous.

Colliery Notes

In firing a shot at a gaseous face, the depth of the hole should be carefully proportioned to the charge put in; moreover, the hole should be stemmed right up to the face of the coal.

It will result in advantage to a coal company if the management will provide a sufficient supply of proper clay, at the faces, for shot-stemming. This action on the part of a company does not entail any great expense and eliminates much danger.

It is difficult to understand why, at some mines where safety lamps are compulsory, the management permits the introduction of tumbler switches and ordinary open porcelain fuses. Either the lamps, or the electrical fittings, are entirely out of place.

It is of no avail to record a measurement of air passing at a point near the bottom of the downcast shaft. It would not be unfair for the rules or laws of all States to prescribe the point at which the air should be measured. At many mines, less than 20 per cent. of the air entering the downcast reaches the working faces.

The laxity that accompanies inquests into the cause of serious mine fatalities in the United States is notorious. It would seem advisable to supply the coroner with power to call in a disinterested mining engineer to advise him as to what questions he should put. Coroners at present rely largely upon the mine inspector. It is obvious why this is not always best.

It is advisable for a shot-firer always to prepare the cartridge for the insertion of the detonator, before withdrawing the latter from his case. He should then place the charge in the hole immediately. If a detonator is lost, search should be made at once, and no metal tool or instrument should be used in the search. If the detonator is not found, the fact should be reported at once to the superintendent.

In an effort to prevent a serious accident, a miner at an English colliery violated a rule of the mine, and was injured. The judge who heard the case remarked that the man showed courage in preventing what might have been a serious accident, but that in doing so, he was guilty of wilful misconduct, and consequently, judgment was given in favor of the colliery company. It is probable no other fair decision could have been rendered, but it is to be hoped that the colliery managers treated the miner fairly.

Europe has never been so largely visited by American coal-mining engineers as during the past year. In several cases our mining companies have spared no expense in aiding their experts to gather all possible information. Undoubtedly the most important result of these investigations will be the more general introduction of the longwall system of working our 4-, 5- and 6-ft. seams. This system of working is almost universally used in Great Britain and on the Continent. Its advantage lies in the greater percentage extraction of coal at a probable less cost.

American coal operators are sure to be interested in the outcome or actual effect of the 8-hour act that has but recently become a law in Great Britain. The returns to date show that the first effect of the act has been to reduce the output at the different collieries from 10 to 25 per cent. It is also stated that the proportion of rise in the price of coal is greater than the increased cost of working. The miners' leaders are urging the men to keep up the output, asserting that to not do so will put a weapon in the hands of the employers when the wages agreement is revised.

It is a fact that natural coal dust will not ignite as readily as dust freshly ground from solid coal. This condition leads to the conclusion, that (considering the coal to be of equal fineness) dust nearest the freshly worked face is most explosive. Experiments are now being conducted to determine the increase in the violence of a dust explosion, when a specified increase in atmospheric pressure has occurred. Such an increase in the atmospheric pressure of a mine may result from various unnatural causes, such as a runaway trip of cars, an explosion of powder, or a fall of roof.

One of the most modern and compact types of coke oven is that known in Europe as the Huessener waste-heat oven, consisting of a rectangular chamber having a taper toward one end, and being about 32 ft. long, 7 ft. high, and 1 ft. 8 in. wide. The capacity of the oven chamber is 392 cu.ft. The analysis of 100 tons of coal put into these ovens showed: Fixed carbon, 62.81 per cent.; volatile matter, 29.47; sulphur, 1.30; ash, 6.42. The products obtained from the 100 tons charged were: 70 tons blast-furnace coke; 2½ tons breeze; 721 gal. tar; 1 ton 2 cwt. sulphate of ammonia; 152 gal. 90 per cent. benzole; 240,000 cu.ft. surplus gas—in gas engines to 9600 h.p.-hrs.; 90 tons of steam, of which 60 tons was surplus.

The increase in the value and demand for the by-products of coking coals is continuing at a rate that will soon brand any further waste of these products as the poorest kind of commercial policy. At frequent intervals our attention is being called to new uses for many products hertofore not considered worthy of careful treatment. Besides its use for making aniline benzidine, and other products of the coal-tar dye industries, and for carbonizing water, benzol is now being used successfully for motor purposes. It has been discovered that its power in the internal-combustion engine is greater than that of petrol, and the difficulties which formerly existed owing to the formation of soot in the carbureter have been overcome by increasing the admission of air.

Mr. Dowling, of the Canadian Geological Survey, after investigation, says that coals formed under high static pressure are unstable; he points out that bituminous coals high in carbon content, which have required high pressures to produce them, on release from pressure have a tendency to give off gas and to coke when heated. On the other hand, coals low in carbon, such as lignites, or those whose alteration has been accomplished by heat and low pressure—among others, anthracite—will be stable. Mr. Dowling states that the occurrance of blow-outs in the "unstable" coals are not due to the liberation of pockets of compressed gas, but as following the same course as an explosion of dynamite, which is simply the re-arrangement of atoms. The substance of Mr. Dowling's belief is that the combined influences of heat and pressure have acted on vegetable remains in the form of peat, and thus made coal. He offers two formulas for producing coal from vegetable remains: (1) Extraction of CO_2, 30 to 40 parts; extraction of CH_4, 20 to 30 parts; extraction of NH_3, 1 part. (2) Extraction of H_2O, 7 to 9 parts; extraction of CO_2, 1 part. He concludes that both processes proceeded concurrently.

Not nearly enough care is exercised in the handling of powder, and the firing of shots in gaseous mines. At one colliery where this problem has been carefully studied, a few of the rules in force may be summarized as followed: (1) No explosive cartridge shall be cut or opened except by the shot-lighter for the purpose of inserting the detonator. If a cartridge of the proper weight is not available, the shot shall not be fired. (2) If a shot misses fire the shot-firer may, after disconnecting the cable from the battery, examine his cable and connections immediately, but if after this examination he is still unable to fire the shot, the working place shall be fenced off, and a danger signal fixed until after the lapse of one hour. (3) Unless special permission is given by the manager, no charge of explosive exceeding 10 oz. in weight shall be fired. (4) No shot shall be fired in a hole less than 20 in. in depth. Every shot-hole shall, when charged, be thoroughly stemmed throughout the length of the hole, and in no case shall the stemming be less than 15 in. in length. (5) No shot shall be fired in the intakes or main haulage roads except when within 100 yd. of the coal face, unless the permission of the manager is first obtained in writing. (6) Every shot-hole must be carefully cleansed before being charged. Where shot-holes in coal are made with a compressed-air percussive drilling machine, the holes, if not actualyl wet, must be cleansed by the aid of water.

THE ENGINEERING AND MINING JOURNAL
Issued Weekly by the
Hill Publishing Company
JOHN A. HILL, Pres. and Treas. ROBERT MCKEAN, Sec'y.
505 Pearl St., New York.
London Office: 6 Bouverie Street, London, E. C., Eng.
CABLE ADDRESS "ENGMINJOUR, N. Y."

Subscription, payable in advance, $5.00 a year of 52 numbers, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines. $6.50 in Canada.

To foreign Countries, including postage, $8.00 or its equivalent, 33 shillings; 33 marks; or 40 francs.

Notice to discontinue should be written to the New York office in every instance.

Advertising copy should reach New York office by Thursday, a week before date of issue.

For sale by all newsdealers generally.

Entered at New York Post Office as mail matter of the second class.

CIRCULATION STATEMENT

During 1908 we printed and circulated 507,500 copies of THE ENGINEERING AND MINING JOURNAL.

Our circulation for August, 1909, was 39,500 copies.

September 4..... 11,000

None sent free regularly, no back numbers. Figures are live, net circulation.

Contents

PAGE

Editorials:
The Nevada Consolidated..... 465
Aluminum..... 465
The New Almaden Mines..... 466
*Sulphuric Acid Lead Chamber Construction.....*Frederick J. Falding* 441
Coal Production of Missouri in 1908.. 445
*Smelting Refractory Lead Ores at Laurium.....*L. Guillaume* 446
Mining Conditions in Nicaragua. *Special Correspondence* 448
Smelting Titaniferous Iron Ores in the Electric Furnace..... 448
Seismic Disturbances and Coal Mine Explosions.....*Audley H. Stow* 449
International Coal and Coke Company, Ltd..... 450
The Ferro-Cerium Lighter..... 451
Binder Materials Made from Sulphite-Pulp-Waste.....*Robert Schorr* 451
*An Accident Caused by an Electric Coal Cutter.....*Special Correspondence* 452
*Coal Mining Method at Kaylor, Penn. *Edward K. Judd* 453
*The Rock-salt Mining Industry in Kansas.....*Sam Ainsworth* 454
The Talc Industry of St. Lawrence County, N. Y..*Special Correspondence* 456
*The Bonanza Ditch of the Yukon Gold Company.....*E. Jacobs* 457
*The Mining Industry in Algeria and Tunisia.....*M. Clere* 460
*Pyrite Mining in New Hampshire. *Albert H. Fay* 463
Colliery Notes..... 464
Chronology of Mining for August, 1909 467
*Determination of the Velocity of Gas with the Pitot Tube. *O. E. Jager and Geo. C. Westly* 468
The Lake Superior Mining Institute. *Special Correspondence* 469
Conditions in the Transvaal. *Special Correspondence* 470
Ray Consolidated..... 470
Details of Practical Mining:
*Chute and Gate for an Ore Bin..... 471
Device for Preventing Vibration of Assay Balance.....*George A. James* 471
*An Automatic Cutoff for Electric Pumps..... 471
*Mine Signal Switch..... 472
*A Movable Picking Floor..... 472
*Chutes for Ore-filled Stopes..... 472
*Smelting Gold Precipitates and Bullion with Oil Fuel.....*Arthur Yates* 473
Electric Smelting of Iron Ore in Sweden 474
The Canadian Cement Merger. *Special Correspondence* 474
August Dividends..... 474
New Publications..... 475
Personals, Obituary, Societies and Technical Schools..... 476
Special Correspondence..... 477
Mining News..... 480
Markets..... 485
Mining Index..... 491
Prices Current, Chemicals, Earths, Minerals, etc..... 496
Illustrated.

The Nevada Consolidated

The directors of the Nevada Consolidated are making good their promise to render quarterly reports to their stockholders. Although these reports are not characterized by a desirable fullness of detail, they are nevertheless much better than no reports at all. We are therefore inclined to praise the management for telling something, rather than criticize it for not telling enough, but hope as time rolls on it will appreciate the wisdom of greater frankness. Certainly in this case the merits of the enterprise appear to be so good that there is no reason why the stockholders should not be granted all the information that they may desire to have.

With its report for the quarter ended June 30, 1909, this company completed what is practically its first year as a producer. Although it has not yet got its gait, i.e., construction has not been finished and production has not yet attained the contemplated rate, there has been a sufficient approach to the latter to enable us to form an idea as to how the original estimates of cost of production are going to be borne out. The estimates of Mr. Channing and some other engineers were in close agreement at about 7c. per lb., New York, on the basis of direct operating expense, with the probability that the real cost, including maintenance items that are frequently charged to capital account, might be in the neighborhood of 8c. per pound.

The report of the company for the quarter ended June 30 does not afford basis for any minute analysis. It says simply that the production was 9,721,873 lb. of copper, with net earnings of $514,945, or $639,244 if those of the company's interest in the smeltery and railway be included. We may assume that the company realized about 12⅞c. for its copper during this period (the quotational average having been 12.89c.). We may estimate the proceeds from gold and silver as amounting to 0.5c. per lb. of copper. On these bases the gross income for the period would have been $1,300,300, and the cost of production, $785,355, or 8.08c. per lb. of copper. The company realized, however, a profit of $124,299 from its share of the Steptoe Valley works and the Nevada Northern railway, in which a large part of its capital is invested, and that profit figures out to 1.28c. per lb. of copper, making the actual cost of the product only 6.8c. per lb. This is undoubtedly the best showing that has been made in working the disseminated porphyry ores and is a brilliant verification of the engineering estimates in connection with this company.

As we have previously remarked, it is impossible from this quarterly report to form any idea as to whether net earnings may have been improperly swelled by charges to capital account of construction that really belong to operation. However, inasmuch as the equipment and plant are still new, there ought not to have been any large charges for maintenance. On the other hand the results for the quarter were achieved from a production at the rate of only 38,000,000 lb. per annum, which is about 15,000,000 lb. less than what is estimated when the additions to plant that are now under way are completed. A particularly noteworthy feature of the report is the large income from the smeltery and railway. This will increase not only with the extension of the production of the Nevada Consolidated, but also with that of other companies in the district, all of which will pay tribute to the railway at least. When the Nevada Consolidated surrendered a half-interest in this railway to the Cumberland-Ely company it sacrificed a highly valuable asset. The manipulations of the majority interest in that connection excited some forebodings as to the fate of Nevada Consolidated when the operating stage should be reached. We are glad to say that none of the fears have materialized, and although the joint ownership in the smeltery by the Nevada Consolidated and Cumberland-Ely results in some complicated arrangements, the minority stockholders in the former have supreme confidence in their position so long as the general direction of both companies is in the hands of Pope Yeatman.

Aluminum

The break-up in the aluminum market in Europe, which followed the dissolution of the convention of producers some time ago, has had rather disastrous results. The British Aluminum Company is in bankruptcy and its affairs are reported to be in bad condition. On the Continent several of the makers are reported in

similar straits, and two or three have been forced to close down. The competition which has existed forced prices down below the cost of production, it is claimed; and these low prices do not seem to have extended the demand to any such extent as might have been anticipated, unitil quite recently, when some large lots are said to have been taken for electrical work. This has resulted in some advance in prices from the very low point reached at one time, and the various companies are unwilling to make quotations until the situation is further developed.

Meantime efforts are being made to renew the convention or syndicate, which formerly existed, but there are many difficulties in the way, and the success of this movement is still uncertain. The aluminum producers seem to be in a rather difficult position. They cannot induce an extension of production except at a very low profit to themselves; and if they maintain the former profitable prices, consumption does not increase.

In this country during the price war abroad foreign aluminum has been offered at prices as low as the duty would permit. It does not appear that these offers have resulted in any considerable sales or imports of the metal. They did, however, have the effect of reducing prices fully one-third, and thus establishing a new level, from which no great advance will be possible. The lower prices resulted in the placing of some good orders, notably for wire for the transmission of electric power, which are now being filled. Whether aluminum has found a permanent place as a competitor of copper for such work remains to be seen.

The New Almaden Mines

A recent change in the ownership of the stock of the old Quicksilver Mining Company, of California, and the changes in the board of directors have been reported in our columns. These changes have been followed by the retirement of the old manager and other officers of the mines at New Almaden, some of whom had been there over 40 years. The new owners have not announced their intentions, but presumably they intend to try new development and to work the mines more actively, believing that there is still some profit to be obtained from them.

New Almaden is an historic place in California. It was the first quicksilver mine in the State, and was for many years exceedingly profitable. In the days when amalgamation was universal and the demand for quicksilver good the mines were operated on a large scale, and without much regard to expenditure. New Almaden was one of the show places of California, and was noted for its buildings and for the lavish hospitality of its managers. A trip to the State was not complete without a visit to the place and its mines.

Gradually, however, the higher grade ore was worked out, the change being most fully felt when the demand for quicksilver began to fall off. The ore left was of very low grade and required careful working and close attention to costs of mining and reduction. Other quicksilver mines were opened and worked, and became of greater importance. For years past New Almaden has been almost forgotten.

Old Californians will be interested in the future of the mine under its new management; but it is hardly to be expected that it will regain its former importance. Certainly it will never hold its old spectacular position.

The so-called anti-dredging convention in California, to which reference has been made in our columns, was one of those movements started by the large class of people in that State who seem, for various, or unaccountable reasons, to be opposed to the mining industry. In this case the movement amounted to very little. The convention was not attended by any representative persons, and its sole outcome was the appointment of a committee to investigate dredging methods and to "expostulate" with the dredgemen should anything be found of a nature damaging to other interests. As the convention adjourned without day, this committee will have nobody to report to, and it is not likely to have much influence.

The agitation against the smelters in California has broken out again in a small way. The fruit growers in Happy Valley, in Shasta county, have formed an organization to force the smelting companies at Coram and Kennett to use smoke-consuming devices. The farming community so aroused is at the nearest point 12 miles in an air line from one of the smelteries and 14 miles from the other. The claim is made that the fumes are of a more damaging nature than those from the Keswick smeltery were, since the two plants mentioned treat considerable quantities of Nevada ores carrying arsenic. It is thought that the trouble can be easily arranged.

In drilling for lead or zinc, either by churn drill or by diamond drill, it is advisable to assay the cuttings or core, because such a record is vastly superior to the indefinite record of "a few shines," or "specks of lead," etc. However, it must be recognized that no matter how carefully the cuttings or core be collected, the assay result is likely to be misleading through errors in assaying, the ordinary commercial methods being more or less dubious upon samples of ore containing very small percentages of these metals. If anyone is doubtful as to this, let him send the same sample to three or four assayers.

The zinc miners are rejoicing in the higher scale of prices for ore that the new tariff has conferred. The zinc-smelting industry is still all at sea and does not yet know where it will land. If price for spelter continues high, the smelters may resume importation of Mexican ore and pay the duty. Something will depend upon whether they will have to pay duty on the metal that is lost in smelting, and also upon the lead—a deleterious impurity—that occurs in some of the ore. We marvel that they do not also have to pay on the iron content, iron also being a protected substance.

California towns are receiving the first consignments of pig iron made on a commercial scale in the electric furnace in this country. The plant furnishing the iron is at Heroult, in Shasta county, and has a present capacity of 25 tons daily. The cost is not stated, but it is sold at a lower price than eastern iron brings in San Francisco.

The strike of the miners employed by the Pittsburg Coal Company, if not quickly settled, is likely to be embarrassing to the trade. September is the month when the heaviest shipments are made to the Lake ports to supply the northwestern demand, and if the strike continues, these must be made chiefly from other districts.

Chronology of Mining for August, 1909

Aug. 2—The United States Smelting, Refining and Mining Company obtained modified injunction permitting it to smelt copper and other ores in the Salt Lake valley, under certain restrictions, including the baghousing of the fumes and neutralizing of acid gases.

Aug. 3—Announcement of the purchase of the Tula iron properties in the state of Jalisco by the Mexican Iron and Steel Company, which is controlled by Boston capitalists.

Aug. 5—At Cordova, Alaska, a $50,000,000 mortgage was filed by the Copper River & Northwestern railroad, a Guggenheim corporation, in favor of the Standard Trust Company, of New York, this being the largest mortgage ever filed in Alaska.

Aug. 6—New United States tariff law became effective, having been signed on the preceding day by President Taft.

Aug. 7—Preliminary proceedings for foreclosure of mortgage on Newhouse Mines and Smelters Corporation property in Beaver county, Utah, in accordance with the plan of reorganization.

Aug. 10—Strike of United Mine Workers results in the closing of the Spring Hill coal mines in Nova Scotia.

Aug. 11—Title to the various powder mills of the Laflin & Rand Company passed to the E. I. Du Pont de Nemours Power Company, which has had a stock control since 1902.

Aug. 12—The timber and mineral lands of the Sierra Madre Land and Lumber Company, formerly owned by Col. W. C. Greene, were transferred to the F. S. Pearson Syndicate, the consideration being $2,000,000.

Aug. 21—During this week, zinc ore in the Joplin district touched $51.50 base, the highest price since the summer of 1907.

Aug. 23—The merger of the principal Canadian producers of portland cement completed by the organization of the Canadian Consolidated Cement Company with headquarters at Ottawa.

Aug. 25—Lake Superior Mining Institute convened at Ishpeming, Mich., for the fourteenth annual meeting, a 3-day session on the Marquette range.

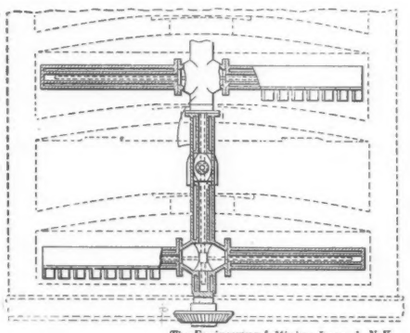
Aug. 28—Formal announcement of organization plans of the Black Lake Consolidated Asbestos Company, Ltd., consolidating a number of the leading producers in the Black Lake-Thetford district in the province of Quebec.

Aug. 29—Serious floods in the vicinity of Monterey, Mex., interfered with transport of ore.

The Union Railroad, the industrial road of the Carnegie Steel Company, has placed an order with the Pressed Steel Car Company for 400 steel underframed box cars.

Roasting Furnace

Frank E. Marcy, of Salt Lake, in U. S. Pat. 920,971, of May 11, 1909 (assigned to Frank Klepetko, of New York), describes a proposed improvement for roasting furnaces involving the air-jacketing of the rabble arms and shafts of McDougall or other types of roasting furnaces. The object of the invention is to prevent undue reduction of the furnace temperature by the cooling water. As shown in the accompanying illustration, Mr. Marcy's arrangement contemplates the interposition of a jacket of air between the part through which the water circulates and the furnace interior, so that the water-cooled walls will not come in direct contact with the charge. The air jacket is thus intended to keep the rabble apparatus at a sufficiently low temperature to resist the disintegrating and destructive effect of the



MARCY ROASTING FURNACE

heat of the furnace operations, to economize in the quantity of water necessary and to prevent undue abstraction of heat units from the charge by irregularities in the water supply.

Smelter Fumes in California

SPECIAL CORRESPONDENCE

The farmers in Shasta county, California, who are organizing in all the school districts against "smelter fumes" say that they have no desire to see the smelting works closed down, but wish to force the companies to control the smoke and fumes. The units of the district associations are to form a county protective association. Meantime some of the Shasta county copper companies, notably the Mammoth, are purchasing easements from landholders, by which the latter relinquish all future claims against the companies for damage from fumes. The companies pay from $50 down and $50 per year to $200 down and $100 a year for these easements. A proviso is inserted in the agreements that the farmers are to receive a specific sum each year until the company constructs devices which put an end to the nuisance. Strange to say, a number of owners of mining claims five miles from the smeltery sold to the company easements of this character. Some men nine miles in an air line southeast or southwest from the smeltery have received $200. One man 13 miles southwest of the smeltery was paid $50. Most of the easements are from farmers close to, or within a few miles of the smeltery.

The contempt charges against the officials of the Selby Smelting and Lead Company were not heard at Fairfield, Aug. 20 as expected, the proceedings being delayed pending ruling on motion for a new trial. The attorneys of the company were prepared to show that they had not violated the injunction as charged. The company claims that very few farmers or residents of towns have made complaint and that damages have been greatly exaggerated. It has, however, endeavored to minimize smoke nuisance by the adoption of appliances to that end.

The organization of the Black Lake Consolidated Asbestos Company has been practically completed, the following mines situated in the serpentine belt of the Black Lake-Thetford district being included in the merger: Union Asbestos; Southwark; Black Lake Chrome and Asbestos Company, and a controlling interest in the Imperial Asbestos Company. These have a total area of 5385 acres. The company will have a capitalization of $3,000,000 common and $1,000,000 noncumulative 7 per cent. preferred stock, together with $1,500,000 bonds, of which $1,000,000 will be immediately issued and the remainder held in the treasury for future requirements. When the bond issue is placed the company will have $500,000 available for equipment and development. The merger includes nearly all the working asbestos mines not in the Consolidated Asbestos Company.

The trade of Germany in zinc and zinc material is reported as below for the half-year ended June 30, in metric tons:

	Imports		Exports	
	1908.	1909.	1908.	1909.
Spelter	14,391	17,753	29,907	32,658
Zinc scrap	190	42	2,804	2,778
Zinc sheets	795	1,186	8,057	8,859
Zinc dust	517	407	1,155	1,529
Zinc oxide, etc	3,953	3,526	12,435	12,680
Zinc ores	91,574	93,049	8,047	8,924

The larger exports of spelter were 12,252 tons to Great Britain, 9480 to Austria, and 3096 to Russia. There were 1030 tons shipped to the United States.

The Gotthard works at Bodio, in the Canton Tessin in Switzerland will begin the production of ferrosilicon in the electric furnace in November. This is a new plant and has available 30,000 electric horsepower, developed by the Biaschina river. It is a new concern, and is independent of the ferrosilicon pool which has its headquarters in Paris.

Determination of the Velocity of Gas with the Pitot Tube

By O. E. Jager and Geo. C. Westly*

Since "smoke-farming" has become such a lucrative business the determination of the amount and nature of the gas passing out of a smelter stack has become proportionally more important. One of the main factors is the determination of the velocity, for which purpose an anemometer is quite unreliable. The present article deals with the determination of the velocity in a flue by means of the Pitot tube.

The Apparatus

The Pitot tube was first used for measuring the velocity of water, but of late years has been applied to the measurement of the velocity of gases. Beyond a few papers in the proceedings of various engineering societies, information on its use is scarce, though the work of Messrs. Klepinger and Burr at Great Falls, Mont., has done much to throw light on the subject of its use. Essentially it is a device for measuring the velocity of a stream of water or gas by means of the velocity head produced, and consists of two tubes, one of which is straight, and the other bent in the shape of an L. The straight tube measures static pressure only, while the bent tube (the horizontal part of the L being turned toward the flow of gas) measures both static and velocity pressure. By connecting these two tubes to the two ends of a U-tube manometer the static pressure is neutralized, so that the manometer shows only the pressure due to velocity.

*McGill, Nevada.

The tubes may be of any length to suit conditions, a handy form of instrument being shown in Fig. 1. Quarter-inch pipe is used, but light brass pipe is more easily handled, especially if the tubes have to be of greater length. *A* shows the static-pressure tube. There are several forms of pressure end, but this one has been chosen on account of its simple construction, and will be found reasonably accurate except for high velocities. Ordinary straight tubing will not do for the static-pressure tube as the pressure is affected by the velocity, the suction action increasing as the velocity increases. Any form of pressure tube, the end of which causes a deflection of the lines of the gaseous stream in passing it, will affect the results obtained.

The velocity tube *B* has its lower end turned up at right angles. The same result is obtained by threading the end and screwing on an elbow. The two tubes are generally bound together as shown at *C*, or screw clamps or collars may be used on each tube, a mark being placed on the tube so as to show when the end is in the proper position in the flue. The tubes must hang vertically when put in through holes in the roof of a flue.

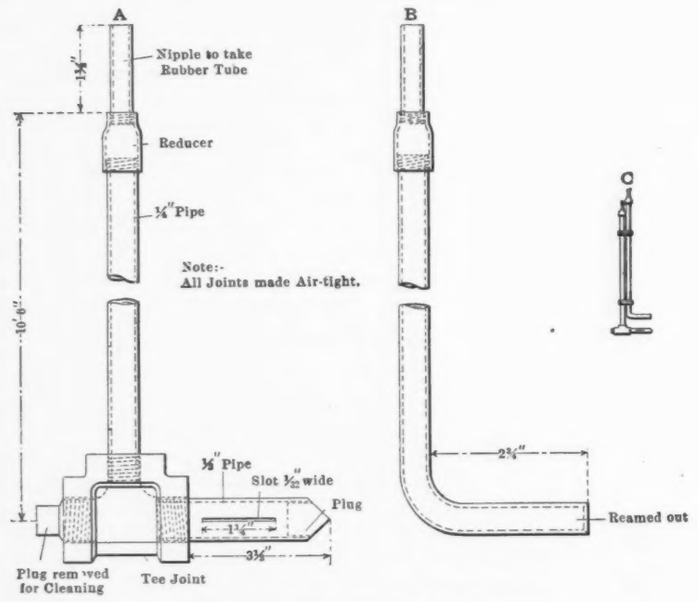


FIG. 1. SECTIONAL VIEWS OF PITOT TUBE

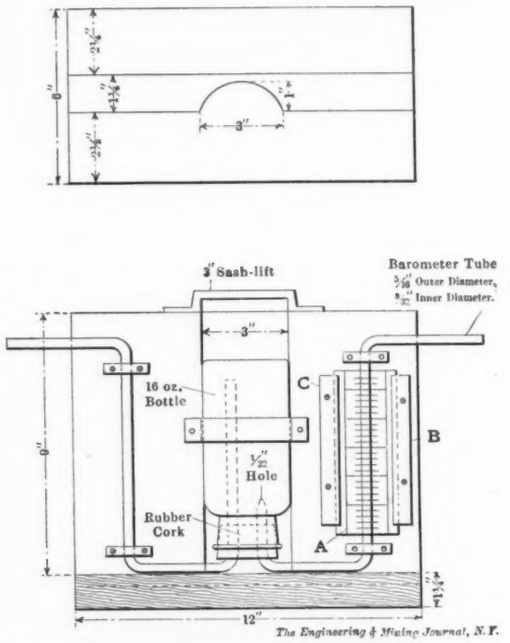


FIG. 2. MANOMETER ARRANGED FOR PRESSURE READINGS

The manometer is shown in Fig. 2. An ordinary U-tube makes accurate reading difficult owing to the continual oscillation of the liquid. The manometer shown in the sketch has two advantages. The end of the tube below the level of the liquid is drawn out to a fine point, thus steadying the variations in pressure and enabling an accurate reading to be taken; also the tube on which the readings are made, having a small diameter in comparison to the bottle (which is really the other leg of the U-tube), it is necessary to note only the deflection on the tube, the corresponding deflection in the bottle being negligible. The manometer thus reads direct. In this case the diameters of the tube and bottle are in the ratio of 0.0938 to 3, so that a rise of 1 in. in the tube would mean a fall of only 0.00098 in. in the bottle. A paper scale *A* is placed behind two strips of tin, *B* and *C*, which are screwed upon the board. This allows the scale to be moved up or down to adjust to zero. Good cross-section paper divided into tenths of an inch can be used for the scale. Each tenth is divided into halves, so that hundredths of an inch can be estimated by the eye.

Method of Operation

If the flue in which the velocity is required measures 15x12 ft., to get the average velocity it must be divided up into equal sections as shown in Fig. 3. The Pitot tube is then placed inside the flue and readings taken in each of the positions indicated by the numerals, thus giving 15 readings to be averaged. A place in which the flue has a good straight run should be selected so as to avoid eddy-current effects which may give minus readings. These must be rejected when making the average. The static-pressure tube need not be moved across the horizontal sections, but may be left hanging in positions 3, 8 and 13 while the velocity tube is placed at all the points, care being taken that the pressure tube does not get in front of, or otherwise interfere with the flow of gas to the velocity tube.

When using the tubes separately in this way, a collar or clamp is screwed on so that it holds the tubes at the prop-

er positions inside the flue. The holes in the roof need not be more than 3 or 4 in. square. Rubber tubes are used to connect the two members of the Pitot to the two glass tubes on the manometer. The temperature of the gases whose velocity is being determined must be obtained at the point where the Pitot readings are made. A thermometer or pyrometer is needed for this. A sample of flue-gas for anaylsis can be taken while the readings are being made. The barometric pressure must also be obtained at or near the same point, at the same time.

For ordinary purposes the best liquid to use in the manometer is grain alcohol, as it is less dense than water; thus giving a greater deflection on the scale. The specific gravity of the alcohol must be determined before using.

Calculation of Velocity

We are now in possession of sufficient data to apply the velocity formula $V^2 =$

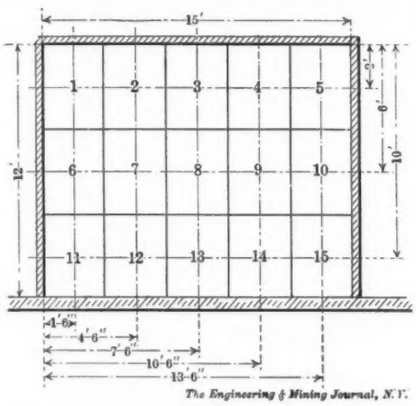


FIG. 3. METHOD OF DIVIDING UP FLUE FOR TAKING OBSERVATIONS

$2gh$, where: g=acceleration due to gravity = 32.16, and h = hight in ft. of the column of gas that produces the velocity V (expressed in ft. per sec.). From the manometer is found the hight of a column of alcohol due to the velocity. Therefore, knowing the specific gravities of both the alcohol and the flue-gas, the hight of a column of gas equivalent to the column of alcohol, h, can be calculated.

Suppose the following data: Temperature of flue-gas = 285 deg. C. Barometer = 27.95 in. = 710 mm.; average of manometer readings = 0.25 in. = 1/48 ft. of alcohol. Specific gravity of alcohol = 0.81. Analysis of flue-gas: CO_2, 9.8 per cent. by volume; N. 79; O, 10.5; SO_2, 0.7; total, 100. From the analysis of the gas we obtain its specific gravity thus:

Bringing volumes to weights:

$$9.8 \times 22 = 215.6$$
$$79 \times 14 = 1106.0$$
$$10.5 \times 16 = 168.0$$
$$0.7 \times 32 = 22.4$$

Dividing sum by $100 = 15.12 =$ sp.gr. relative to hydrogen. Hence molecular weight = 30.24. At zero deg. C. and 760 mm. pressure 22.3 liters of flue-gas will weigh 30.24 grams. At 285 deg. C. and 710 mm. 22.3 liters =

$$\frac{22.3 \times 558 \times 760}{273 \times 710} = 49 \text{ liters.}$$

Therefore: 49 liters of gas weigh 30.24 grams or one liter weighs 0.617 gram.

But 1 liter of alcohol weighs 810 grams or is 1313 times as heavy as the gas. Therefore hight of column of gas equivalent to 1/48 ft. of alcohol = $\frac{1}{48} \times 1313 = 27.34$ ft. Applying the formula $V^2 = 2gh$ gives: The velocity of the flue-gas, $V = \sqrt{2 \times 32.16 \times 27.34} = 41.93$ ft. per sec. = 2515.8 ft. per min. This method of determination is applicable to any set of conditions.

The Lake Superior Mining Institute

Special Correspondence

The fourteenth annual meeting of the Lake Superior Mining Institute began at Ishpeming, Mich., Aug. 25. The morning of Aug. 25 was devoted to registering and distribution of badges. A short trip to the Maas mine at Negaunee was made before lunch. Upon returning from the mine the party went direct to the golf club house where the ladies of Grace Episcopal church served a lunch. In the afternoon all the members of the institute witnessed a baseball game, played by Ishpeming and Negaunee.

The evening session was held at the opera house. The meeting was called to order by M. M. Duncan, president of the institute, and in his address he called attention to the urgent necessity for a change in the laws governing liability for personal injury. He discussed briefly the German insurance system, and the English system as governed by the employers' liability act and the compensation act.

Committees for the nomination of officers and other purposes were appointed.

Papers

The following papers were presented at this meeting:

1. "How Reforestation May be Applied to the Mine Timber Industry," by Thomas B. Wyman, Munising.
2. "Mine Accidents," by John T. Quine, Ishpeming.
3. "The Sociological Side of the Mining Industry," by W. H. Moulton, Ishpeming.
4. "Biographical Notes," by J. H. Hearding, Duluth.
5. "Reminiscences of the Early Days on the Marquette Range," by George P. Cummings, Marquette.
6. "Historical Sketch of Copper Mining on Lake Superior," by Alfred Meads, Marquette.
7. "Code of Mine Signals, Cleveland-Cliffs Iron Company," by O. D. McClure, Ishpeming.
8. "Capillary Attractions in Diamond Drill Test Tubes," by J. E. Jopling, Ishpeming.
9. "Sinking Reinforced Concrete Shafts through Quicksand," by Frederick W. Adgate, Chicago.
10. "A Diamond Core Section of the Mesabi Rocks—No. 1," by N. H. Winchell, Minneapolis.
11. "Wood Preservation with Especial Reference to Mining Timbers," by John M. Nelson, Jr., U. S. Forest Service, Washington.
12. "Iron Ore and the Tariff," by H. Olin Young, Ishpeming.

The Meetings

The papers by Messrs. Jopling, Hearding and Cummings were read at the Wednesday evening session. A short talk was also given by William Kelly, general manager of the Penn Iron Mining Company, Vulcan, Mich., on the construction of the Bryer Hill concrete-lined shaft, now 700 ft. deep.

One of the principal features of this meeting was that the social side of life was not neglected. No business sessions were held during the day-time. In fact, it was a pleasure outing from start to finish. Two special trains left for Marquette early Thursday morning, and a short visit was made at the Queen mines of the Oliver Iron Mining Company. At Marquette the plants of the Pioneer Iron Company and the Lake Shore Engine Works received visits prior to a lunch served by the latter company on its grounds adjoining the lake. An opportunity was given all members to go by the steamer "Minnie M" to Munising. An enjoyable 40-mile lake ride ended at Munising, where supper in the dining cars was awaiting the members.

The evening session was held in the Alger county court house, at which the papers by Messrs. Wyman, Quine and Nelson were read. The others were presented by title only.

At the close of the session Thursday evening the election of officers took place, and the treasurer's report was read. The report shows that the expenses for the year were a little over $3000, while cash in treasury is $4510. The secretary's report showed that at the close of the year the institute had a membership of 511; new members received during the year, 72. Forty-one new members were elected at this meeting.

The following officers were elected: President, D. E. Sutherland, Ironwood, Mich.; vice-presidents, J. M. Bush, Ironwood, Mich.; F. W. Spurr, Houghton, Mich.; J. H. Rough, Negaunee, Mich.; managers, W. J. West, Hibbing, Minn.; C. E. Lawrence, Iron Mountain, Mich.; treasurer, E. W. Hopkins, Commonwealth, Wis.; secretary, A. J. Yungbluth, Ishpeming, Mich. After adjournment a reception for the members was given at the Beach inn by the Munising Business Men's Club.

Friday morning was spent in visiting the industrial plants of Munising, which included sawmills, pulp mill, tannery and veneering works. Launches were also provided and a number of the party went to Grand island to visit the game preserve maintained there by the Cleveland Cliffs Iron Company.

The afternoon was spent in making a hurried trip through the Swanzy district, where the Cleveland Cliffs Iron Company is doing a large amount of development work. The new model town of Gwinn entertained the party for a short time. The institute train returned to Ishpeming at 6 o'clock, and the meeting adjourned. About 300 members and guests were in attendance.

Conditions in the Transvaal

SPECIAL CORRESPONDENCE

At the annual meeting of the Central Mining and Investment Corporation held in London recently, the chairman, Sir Julius Wernher, after describing the operations of the company, made an interesting speech in which the general situation of the gold-mining industry of the Transvaal was reviewed. Although great progress has been made during the last few years, he is of the opinion that a further expansion of the industry and a further reduction in costs may be looked for. The organization into larger units than formerly has proved advantageous and it is expected that as time goes on the benefits derived from the amalgamation policy will be more marked. The change from steam to electric power which will be distributed to the mines from large central power stations will, it is hoped, decrease the cost of power.

The improved agricultural position of the colonies may also be expected to benefit the mines, as it will tend to reduce the cost of transportation. Up to the present, the exports of South Africa have been but a fraction of the imports and trains have come down empty from the interior and the ships have had to leave in ballast. If mealies, oats and coal can be exported and perhaps, in a few years, cattle and sheep, the high rates now charged by the railways and ships will no longer be justified.

With a reduction in the transport rates, a reduction in the cost of living may be confidentally awaited, a result which should lead to increased immigration. A few years ago, owing to the high cost of living, many of the industrial population kept their families in Europe. With a reduction in the cost of living, the necessity for this undesirable state of things will vanish. One of the dangers of South Africa is the smallness of the white population, as compared with black, and it is, therefore, of great importance that the cost of living, which affects so strongly the immigration of Europeans, should be reduced as much as possible.

The native labor question has again given rise to considerable apprehension, as there has been a falling off in the number of natives recruited. But on this important point, Sir Julius is not despondent, pointing out that at this time of the year the labor supply always shows a decrease and that the loss is, after all, only a small percentage of the total supply. A slight extra efficiency of the native would soon put the matter right and having regard to the fact that since the introduction of the Chinese, the standard of the work done by the native has improved, it does not seem unreasonable to count on some improvement in his efficiency in the future.

LABOR

According to the official record, the natives employed in the gold-mining industry in July, 1908, amounted to 149,000 plus 19,000 Chinese, total, 168,000. In May, 1909, the total was 189,000, and in June there were 176,000 natives and 5500 Chinese, total, 181,500, so that at the end of June the figures were not far below the maximum.

It has frequently been contended that any serious shortage of natives could be met by the increased use of machine drills to the improvement of which much attention has recently been paid. At the present time a competition is in progress for substantial prizes offered by the chamber of mines. But machine drilling, except in wide stopes, is more expensive than hand drilling and consequently a shortage of native labor cannot be met by the increased use of machine drills, without an increased cost of working.

Sir Julius' statement on this point, which must be founded on the advice given by his technical advisers, is important. It indicates that the small stope drill, which is so much wanted, has not yet been found. The numerous tests and competitions appear to have failed in evolving a satisfactory machine. There has undoubtedly been an improvement in this direction, but no satisfactory machine for replacing hand labor has as yet been produced.

New Dredges in California

SPECIAL CORRESPONDENCE

Boston capitalists have bonded about 2000 acres of land in the vicinity of Centerville, 10 miles from Chico, in Butte county, California, and are to finance the property as a dredging venture. The lands bonded are on Butte creek, and above the point where there is already a dredge in operation. Boring operations will at once commence.

L. G. Van Vector and associates, of Oakland, have been making surveys of the lower Klamath river with a view to making arrangements for putting a dredge at work. It is believed that the bed of the Klamath carries large quantities of fine gold washed down from the tributaries and by the cutting of the main river itself. Mining operations have been going on along the river for 60 years and much gold has been taken from the placers. More or less of the finer gold has doubtless been carried down in the freshets with the fine sands and gravels. No dredging has ever been done in the river to amount to much, the stream being torrential in the winter months. There is doubtless a good field for dredging operations at points on the river where the machines may be protected during flood periods.

James and Samuel Sample and L. Briscoe and associates, of Fresno, have acquired a large tract of land a short distance from Weitchpec in Humboldt county, on the Klamath river. Machinery is being put in and the operations are expected to be quite extensive. A number of men have already been set at work.

Ray Consolidated

According to the *Boston News Bureau*, a leading interest in Ray Consolidated has made the following statement:

"The Guggenheims and their immediate friends undoubtedly own a majority of the stock of the Nevada Consolidated and have a majority in the board of directors. The Guggenheims have about 35 per cent. ownership in the stock of the Utah Copper Company, and have a minority representation on the board. Their relations with the other directors, however, are most friendly and coöperative, and as they are in the copper-smelting and copper-selling business and are willing to make fair terms, it is only natural that they should be the agency for a company in which they are a large shareholder.

"The Guggenheims have no interest, known to the directors, in either Ray Consolidated, Gila, or Chino, and while there might be a concealed interest, we have the best of reason to believe that such is not the case.

"The man who stands most prominent in the development of these low-grade porphyries is Daniel C. Jackling, who is the operating head of Utah Copper, Ray Consolidated, Gila and Chino. Associated with him, more particularly in the engineering end, are A. Chester Beatty, and, in the executive end, Charles M. MacNeill. In addition to a number of intimate personal associates these gentlemen are closely identified with the banking houses of Hayden, Stone & Co. in New York and Boston, and Shove, Aldrich & Co., in Colorado Springs. Sherwood Aldrich is president of both Ray and Gila, and his partner, Mr. Shove, is treasurer."

Details of Practical Mining

Notes of Interest to the Operators of Small Mines as Well as of Large Mines. The Things That Have to Be Done in Everyday Mining

REPORTS FROM EXPERIENCE

Readers of the JOURNAL are invited to contribute to this department. Articles should be brief, thoroughly practical, and preferably illustrated by drawings or sketches. Our draftsmen will prepare properly any kind of a pencil sketch that is intelligible. Something that is an old story in one district may be quite unknown in another. Articles accepted and published are suitably paid for.

Chute and Gate for an Ore Bin

The chute shown in Fig. 1 is one of six in the bottom of a 1000-ton bin, 30 ft. in diameter and 20 ft. deep, used by Witherbee, Sherman & Co. The chutes are placed in two rows of three each, and

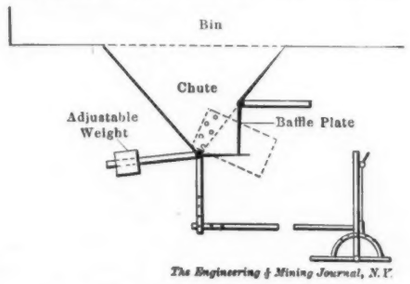


FIG. 1. CHUTE USED BY WITHERBEE, SHERMAN & CO.

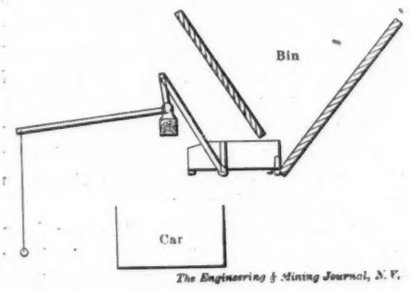


FIG. 2. CHUTE USED BY THE VERMONT COPPER COMPANY

are operated by levers, as shown. The six levers are on a small platform at one side of the bin and are operated by one man without changing his position. The gate proper, when closed, is in a horizontal position and is partially balanced by a weight on a piece of ½x2½-in. steel bar 2½ ft. long. The baffle plate is held in position by means of an iron bar, to which a weight may be attached if necessary. The baffle plate prevents the larger pieces of ore from scattering too much as they leave the bottom of the bin. The plate is about 16x30-in., and the gate is of like dimensions. With three of these chutes open it is possible to load a 40-ton car in 1½ minutes. The ore for which this chute is used has passed through a 3-in. grizzly, so there are no exceedingly large lumps to choke the gateway. Rectangular pieces of steel are riveted on the sides of the chute to form cheeks which prevent the ore from spreading too much as it leaves the bin. The chute shown in Fig. 2 is one that is used by the Vermont Copper Company, South Strafford, Vermont.

Device for Preventing Vibration of Assay Balance

BY GEORGE A. JAMES*

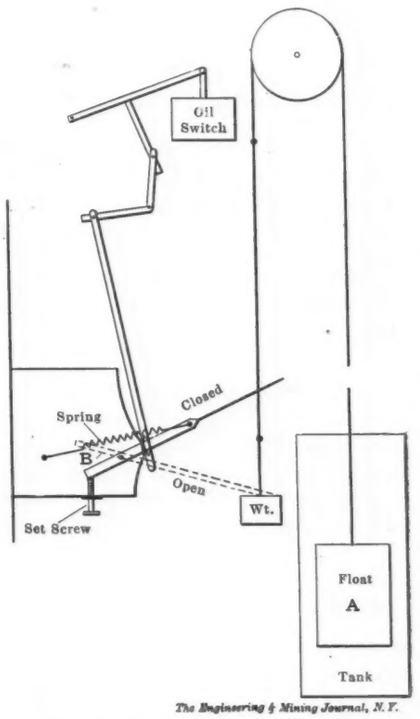
I have had in use a simple little device for preventing the vibration of chemical and assay balances, which has been so valuable to me that I think it will be of interest to other assayers and chemists. By placing a small piece of rubber under one leg of the balance, all ordinary vibration is overcome. We use a piece of rubber, cut from an ordinary rubber band, about ½ in. square, which is placed in the cup of the glass base, usually used under the legs of the balance. The balance thus represents an immovable body, as compared to the movements transmitted through the elastic medium, represented by the rubber.

It is important that the rubber be placed only under one leg. Our balances are on benches, resting on floors, with no degree of solidity, and yet cause as little trouble as would occur had we built brick pedestals to solid foundation. I have even used this method on floors over moving line shafting without any great inconvenience. It has occurred to me that a similar contrivance could be used to advantage for small telescopes, etc.

*Assayer and chemist, 28-32 Belden place, San Francisco, Cal.

An Automatic Cut-off for Electric Pumps

The device shown in the accompanying illustration has been in use by Witherbee, Sherman & Co., at Mineville, N. Y., more than three years and has operated satisfacorily. It is used on a three-plunger electric pump for handling mine water intermittently from a large sump. A float *A*, an 18-in. cube, is constructed of sheet copper and is placed in a tank connected with the sump. A cord is attached to the float and operates over a pulley with a weight suspended on the other end. The cord has two clamps securely fastened, one above and the other below a slotted lever arm. As the water rises in the sump the float in the tank will also be elevated. The rope passing through the slotted lever arm will, when the clamp comes in contact with it, carry the arm down to a point past the center, when the tension spring *B* operates instantly, and thus closes the circuit, which starts the motor and pump. As the water is lowered, the cord is reversed and the



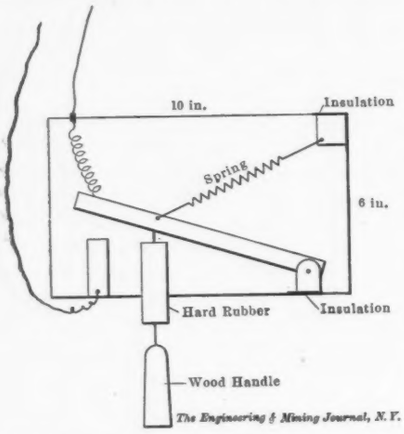
ARRANGEMENT OF AUTOMATIC CUT-OFF

lever is driven past the center when the spring again acts automatically and opens the switch. The scheme here used is in connection with an oil switch, yet could be used with an air switch when using only a small current, or with carbon contacts. However, for heavy current the oil switch should be used. The levers are adjustable so that the desired motion is given. The advantage of this cut-off is that it acts automatically and very little attention other than an occasional oiling need be given the pump. The first cost of the equipment is much less than the solenoid type. The mechanism is simple

and can be inclosed so that the little moisture that reaches the parts does not injure the apparatus.

Mine Signal Switch

The accompanying illustration shows a spring switch used in connection with an electric signal system. It is built in a metal box 6x10x5 in. deep with a hinged door on one side. When giving signals

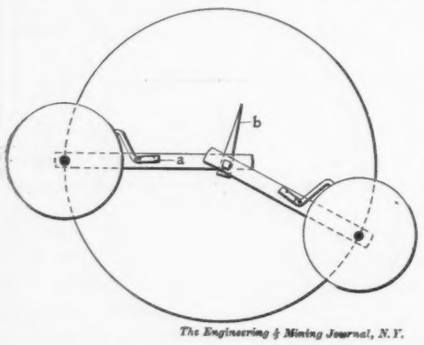


SPRING SWITCH FOR ELECTRIC MINE SIGNAL

the operator catches hold of the wooden handle that hangs below the box, pulls down, and the spring in the box breaks the circuit as soon as the operator releases his hold. The signal system, which is used in connection with this switch, flashes a light in addition to ringing the gong.

Overwinding Bell Signal

A signal used by the Port Henry Iron Ore Company is shown in the accompanying illustration. The dial is 30 in. in diameter and has two 10-in. gongs at-

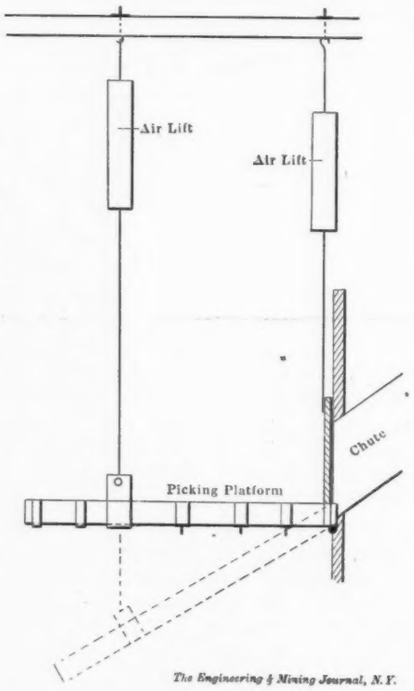


ARRANGEMENT OF GONGS FOR OVER-WINDING SIGNAL

tached to adjustable arms. The gongs are so adjusted that they will ring about 10 ft. before the skip is ready to dump. The hammer *a* that strikes the gong is tripped by a pointer *b*, which is operated by a worm gear, connected with the winding drum. The signal referred to is used on a balance bucket hoist, and when the movement of the drum is reversed the pointer turns backward and operates the other gong. The end of the hammer at *a* is attached to the main part of the hammer by a thin spring on the top which acts as a hinge to allow the pointer to pass the hammer on its return.

A Movable Picking Floor

A picking floor of the following description is used by Witherbee, Sherman & Co. for hand-picking large ore that will not pass through a 6-in. grizzley. It consists of a movable ore chute 5 ft. wide and 12 ft. long, built of heavy sheet iron, with sides 1 ft. high. One end is supported or hinged just below the chute from the ore bin. The platform is practically level, and a ton or more of lump ore is discharged upon it at a time, and



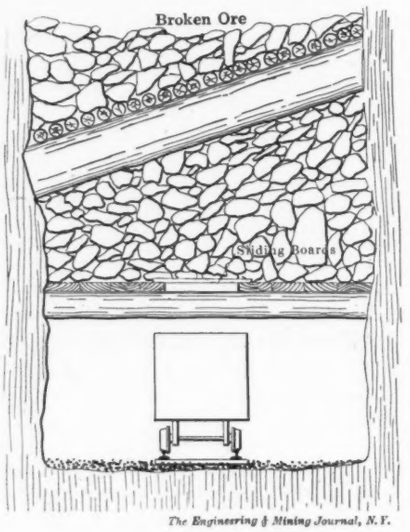
COMBINED CHUTE AND PICKING PLATFORM

two men pick out the barren rock. When the platform is full of ore, the outer end is lowered by an air-hoist and the ore slides directly into the car for shipment. The second-class ore is tossed to a car on an adjoining track, while the waste rock is disposed of by means of a bucket suspended from a carrier which operates on an I-beam.

Chutes for Ore-filled Stopes

One of the drawbacks to the use of the shrinkage system of stoping is the trouble caused by large boulders obstructing the chutes. It is not always possible to break the boulders in the stope before they are covered with muck, and the history of an ore-filled stope is usually one of continuous blasting and barring at hung-up chutes. Further, in a stope of considerable width, the chute opening does not usually extend across the whole width of the stope and the withdrawal of ore causes unequal settling at the top of the pile.

A chute which overcomes these disadvantages is described in the *Aust. Min. Stand.* (June 23, 1909) by Percy Rolfe. It goes by the name of "chinaman," and is extremely simple in design, and effective in operation, consisting merely of a plat-



THE "CHINAMAN"

form erected beneath a hole in the lagging between two stulls. The lagging is open for the full distance between two adjacent stulls, and also from wall to wall. The ore, having a free passage through the aperture, forms a heap on the platform below in the rough shape of a truncated wedge, the sides taking up the angle of repose of the broken rock.

The platform allows the passage of a car underneath, and is constructed with loose boards in the center, as shown in the accompanying sketch.

It is an easy matter to fill a car from this platform by moving one of the loose boards, and the "chinaman" has the advantage that it never hangs up or gets choked, as is frequently the case with chutes possessing sliding doors. Any big rocks, which must inevitably get covered over sometimes in the stope, come through the "chinaman" quite freely, and when on the platform they can be broken with a hammer, or, if too big, they can be "popped" with dynamite without danger to the chute. This chute requires no repairs; its only defect is the necessary reduction in the hight of the level at the point where it is erected. The "chinaman" possesses the advantage that the ore which is run into the car is not subjected to any pressure from the rock above, which makes the sliding door of the ordinary chute difficult to manipulate.

Smelting Gold Precipitates and Bullion with Oil Fuel*

By Arthur Yates*

At the Redjang Lebong gold and silver mine, Sumatra, we have a 70-stamp battery with cyanide works, and our precipitation in the latter is done in the usual zinc boxes, the extractor-house equipment including an acid treatment tank for "shorts" only, a filter press, and a calciner, the latter dealing with both the nonacid-treated precipitate and the acid-treated "shorts." We find that good washing and good calcination materially affect the amount of matte produced in the smelting of the precipitate from the "shorts."

Tilting Furnaces Used

The smelting of both precipitates is carried out in two tilting furnaces, also called Balbach or Faber du Faur furnaces; these find an application in the metallurgy of zinc, and I believe were first used in connection with the gold precipitates of the cyanide process in Western Australia.

The inside measurements of a retort are: mouth, 6½ in.; greatest diameter, 13¾ in.; bottom diameter, 9½ in.; length, 30 in. The mouth is closed during smelting with the stand of a No. 50 salamander crucible. The retort sits in the furnace at an angle of 30 deg. to the horizontal.

The furnaces, as supplied by the maker, were bricked in on top and covered with a casting having a central fuel-feed door. This arrangement threatened us with considerable work and expense every time a retort had to be changed, also with bad distribution of the fuel and troublesome stoking, besides interfering with the partial turning of the retort, which is necessary every day of service, to prevent cutting through on the metal line. So we improved it by closing in the top with three loose arches of firebrick, the bricks of each arch being clamped together with a strap of 3x½-in. flat iron with a ring bolt over the center by which it may be lifted. We also placed a large, loose fireclay tile over the neck of the retort within the front plate casting. These adjustments enable the retorts to be changed quickly and without expense. In case a retort should crack or cut through, there is a 2-in. hole plugged with ore slimes in the center of the furnace bottom, through which the metal and slag can be run.

Coke at £15 per Ton

The furnaces are compact, handy and clean in operation; the retort, which projects through the front casting of the furnace, is charged from the outside, and there is none of the heat and trouble which are associated with the reverberatory and pot furnaces. The contents are always under control, and the removal of the charge, by turning a handwheel which tilts the furnace, is simple and safe. Until April, 1908, the furnaces had been worked with a mixture of coke and charcoal, charcoal alone not giving sufficient heat to melt the charge. The difficulties attending transport here made this fuel expensive, as coke costs up to £15 6s. per ton.

Four "Billow" atomizers, class "FM," made by the National Supply Company, of Chicago, and costing $20 each, were ordered and tried in April with excellent results, two being used with each furnace. The furnaces were filled in with firebricks until a space of only 2 in. was left around the sides and bottom of the retort. Sitting on the neck of the retort in front, and supported on a brick in the flue at the back, half of an old retort, cut longitudinally, was fixed as a hood. Just below the retort, and centrally placed in the sides of the furnace, two pieces of 3-in. pipe were built into the brickwork and in these the atomizers were placed, their brass shells being protected by a cover of 2-in. piping screwed over them and projecting 1 in. in front.

Kerosene Oil as Fuel

Kerosene oil is used, and each furnace has a 20-gal. oil-storage tank placed 18 ft. above the atomizers, with which they are connected by ¾-in. piping and flexible metallic (steel) tubing. Air at about 40 lb. pressure is delivered through a 2-in. main with ¾-in. branches fitted with ½-in. brass cocks and connected to the atomizers by ¾-in. flexible metallic tubing. To economize heat, and assist the vaporizing of the oil, the air-supply main enters the stack at the junction of the two furnace flues and about 14 ft. of its length is coiled therein, thus giving the air feed a high temperature and effecting a saving of oil.

The front casting of the furnace has a 2-in. sight hole, fitted with a mica plate, through which the working of the atomizers can be observed. The two flames are set so that they point slightly upward and converge and meet one another just below the retort, with the result that the force of the jet is broken, and the heat is distributed where most required. A white flame is used for a few minutes at the start until the atomizers and furnace are hot and vaporize the oil properly, after which more air is admitted and less oil, giving a blue flame, with complete combustion. With precipitate carrying only a small percentage of sands or ore slimes, 1200 lb. can be run down between 6 a.m. and 4 p.m., or 600 lb. per fire per day, this being made up of two pours of about 300 lb. each. The retort will take 150 lb. to 200 lb. precipitate and fluxes on starting, the rest being added as the charge melts down.

LOG RETURN OF TWO MONTHS CLEAN-UP.

	March.		May.	
	First Clean-up. %	Second Clean-up. %	First Clean-up. %	Second Clean-up. %
Precipitate:				
Gold	7.81	7.48	6.67	8.03
Silver	48.96	48.96	46.81	48.84
Selenium	2.10	3.20	3.86	2.94
Silica	10.34	8.74	12.64	10.12
Zinc oxide	8.07	7.23	12.35	12.04
Other oxides (as Fe_2O_3)	22.72	24.39	17.67	18.03
Roasted weight, lb	1,975	1,567	2,055	1,920
Shorts:				
Gold	7.58	6.98	7.35	6.43
Silver	47.87	40.25	44.21	43.06
Selenium	5.56	4.88	6.06	7.98
Silica	10.36	6.80	9.50	10.98
Zinc oxide	5.03	13.72	7.62	9.75
Other oxides (as Fe_2O_3)	23.60	27.27	25.26	21.88
Roasted weight, lb	526	432	697	815

	March.	May.
Precipitate:		
Pressed weight, lb	6,356	8,294
Pressed weight, lb	3,542	3,975
Per cent. loss	44.2	52.0
Ounces bullion	32,170	34,416
Ounces gold	3,883	4,207
Ounces silver	26,296	28,090
Ounces bullion per lb. roasted precipitate	9.08	8.61
Ounces gold per lb. roasted precipitate	1.09	1.05
Ounces silver per lb. roasted precipitate	7.42	7.06
Pound borax per lb. roasted precipitate	0.126	0.147
Pounds soda per lb. roasted precipitate	0.063	0.070
Pounds slag	1,600	1,740
Slag assay, per ton, gold dwt	5.6	7.7
Slag assay, per ton, silver dwt	501.0	1917.2
Shorts:		
Pounds wet weight	3,232	3,600
Pounds pressed weight	1,712	2,735
Roasted weight, lb	958	1,512
Per cent. loss on wet weight	70.3	58.0
Ounces bullion	7,560	12,323
Ounces gold	954	1,676
Ounces silver	5,845	9,638
Ounces bullion per lb. roasted shorts	7.71	8.14
Ounces gold per lb. roasted shorts	1.00	1.17
Ounces silver per lb. roasted shorts	6.10	6.30
Pounds acid per lb. roasted shorts	2.08	1.32
Pounds borax per lb. roasted shorts	0.175	0.148
Pounds soda per lb. roasted shorts	0.058	0.037
Pounds iron per lb. roasted shorts	0.018	0.016
Pounds slag	740	740
Slag assay per ton, gold, dwt	10.8	32.7
Slag assay per ton, silver, dwt	1,260.2	2,785.1
Total weight of slag, lb	2,340	2,480
Average oz. slag per oz. bullion	0.94	0.84
Retorts used	5	4
One retort = lb. precipitate and shorts	900	1,372
One retort = oz. bullion	7,946	11,685
One retort = oz. gold	967	1,470
Pounds precipitate and shorts, pressed	8,068	11,029
Pounds precipitate and shorts, roasted	4,500	5,487
Per cent. loss	44.2	50.2
Ounces bullion	39,730	46,739
Ounces gold	4,837	5,883
Ounces silver	32,142	37,728
Ounces bullion per lb. roasted	8.82	8.51
Ounces gold per lb. roasted	1.07	1.07
Ounces silver per lb. roasted	6.92	6.87
Average fineness, gold	121.17	112.3
Average fineness, silver	810.12	807.8
Fine metal	931.29	920.1
Oil used, gallons	.....	440.0
One gallon oil = lb. precipitate and shorts	.....	12.47
Smelting time, hours	140	60

On the 48 analyses of roasted precipitate and shorts made in 1907 the bullion obtained was 5 per cent. gold and 4.2 per cent. silver more than called for.

*Reprint of an article in *Journ. Chem., Met. and Min. Soc. of South Africa*, June, 1909.

†Lebong Donok, Benkoelen, Sumatra.

LARGE SAVING EFFECTED

The consumption of oil may be reckoned at 4 gal. per hour for each fire, or 1 gal. of oil for 15 lb. of roasted precipitate. In May the consumption of oil was 440 gal., which works out at 1 gal. per 12.47 lb. of roasted precipitate, but this includes the remelting of bars and matte, etc., also the melting of two mill bars.

With the oil our smelting occupies about 60 hours per month, as against 140 hours with mixed coke and charcoal on similar material; that is to say, a European smelter and four boys are working 6 days per month as against 14 days. Add to this advantage the easy control, the regular heat, and the cleanliness of the oil-fuel plant, and I think its use will commend itself to men whose cyanide plants are situated in districts where oil can be obtained at moderate cost. The price of the complete castings for a tilting furnace is about £90 f.o.b. London, and the retorts cost £3 2s. 6d. each, f.o.b. London.

Tabulated herewith is a copy of the log return of two months' clean-up.

Electric Smelting of Iron Ore in Sweden *

In order to test and develop a successful process for the smelting of iron ore by electricity a number of Swedish ironmasters have organized a company under the name of the Trollhattans Elektricka Jernverk, to build a plant on a commercial scale. Upon the actual results obtained will depend a further extension of the plant. An additional object is to obtain practical experience in the working of the process. The capital subscribed is 600,000 kroner, or $160,800, which is believed to be sufficient to build the plant and provide working capital.

The estimated cost of the plant is $91,120, to which is added $6770 for patent licenses, making a total of $97,890, and leaving about $63,000 as working capital. The chief items of cost given—reducing Swedish money to dollars—are: Electric furnaces, motors, etc., $44,220; buildings, $26,532; transporting machinery, $7236; crushing machinery, $4020; superintendence and extras, $9112. Some of these items seem to have been figured on rather a low basis.

The new works will be situated near Guttenburg at Trollhättan where large water-power developments have been carried out by the Swedish government. The company has an option on 10,000 h.p. at a price of $10.05 per kw.-year for the first 10 years, and at $13.40 for the following 10 years. Present plans cover the erection of three furnaces, two of which will be working while the remaining one will be held in reserve. Each furnace will have a capacity of 2500 h.p., and will produce 7500 tons of pig iron a year. The intention is to use coke as a reducing agent, because coke in this furnace gives a pig iron having qualities equal to that of the charcoal iron, and coke is cheaper than charcoal, which otherwise is used almost exclusively in Swedish blast furnaces. A suitable metallurgical coke can be obtained for $5.63 per ton. The ore used will be shipped from the mines at Grängesberg, situated about 200 miles from the furnace, part of which distance is covered by water transportation.

The ore will cost $1.87 per ton at the mine; transportation to Trollhättan, $1.29; total, $3.16 per metric ton at the works. On this basis, and with an output of 15,000 tons yearly, the cost per metric ton of pig iron is estimated as follows:

Ore, 1700 kg	$5.360
Coke, 300 kg	1.688
Limestone, 100 kg	0.161
Electric power, one-third horsepower year	2.466
Electrodes, 8 kg	0.536
Working expenses	2.466
Royalties on process	0.268
Interest and amortization	0.724
Total cost per ton	$13.669

Working expenses include maintenance, wages, laboratory and office costs. Taking current prices, the iron should sell at $15.50 per metric ton, which would leave a profit of $1.83 per ton. On a production of 15,000 tons yearly this would give a net return of $27,450, or about 17 per cent. on the capital. Advance estimates of this kind, however, must be accepted with a good deal of caution.

The outcome of this enterprise will be watched with great interest by those acquainted with the development of the electric smelting of iron ore in places where conditions are favorable to such a process. So far the experimental furnace has been running only for a period to be measurd by days or weeks, and it remains to be seen whether the design will stand the crucial test of running commercially over long periods. A successful outcome of the enterprise will, in many cases, have an important bearing upon the iron industry.

*Abstract of article in *Electro-Chemical and Metallurgical Industry*, August, 1909.

The Canadian Cement Merger

SPECIAL CORRESPONDENCE

The merger of Canadian cement companies, of which mention has heretofore been made, has been completed, and a Dominion and a Canadian charter issued to the Canada Cement Company, Ltd., capitalized at $30,000.000 of which $11,000,000 is cumulative preference and the balance common stock. An issue of $8,000,000 bonds is also authorized. It is stated that the present issues will be $9,000,000 preference stock, $12,500,000 common stock and $5,000,000 bonds. The incorporators are Sir Sandford Fleming, Joseph S. Irvin, Hon. Wm. C. Edwards and John P. R. Booth, all of Ottawa; Hon. Robert Mackay, Rodolphe Forget and Wm. M. Aitken, all of Montreal; and Francis B. Dunsford, of London, England.

The following plants are included: Vulcan Portland Cement Company, Montreal; Belleville Portland Cement Company, Belleville, Ont.; Canadian Portland Cement Company, Marlbank and Port Colborne, Ont.; International Portland Cement Company, Hull, Quebec; Western Canada Portland Cement Company, Exshaw, Alberta; Lakefield Portland Cement Company, Lakefield, Ont.; Owen Sound Portland Cement Company, Owen Sound, Ont.; Alberta Portland Cement Company, of Calgary, Alberta. Negotiations with the Lehigh Portland Cement Company of Belleville, Ont., are still in progress.

The company proposes to construct new plants immediately at Winnipeg, Manitoba and Victoria, B. C., where deposits of suitable material are available.

August Dividends

In the accompanying table are shown the amount per share and total amount of the dividends paid during August, 1909, by a number of mining and industrial companies in the United States, Canada and South and Central America.

AUGUST DIVIDENDS.

U. S. MINING COMPANIES.	Location.	Amt. per Share.	Amt. Paid.
Amalgamated, c	Mont.	$0.50	$769,439
Bunker Hill & Sullivan	Ida.	0.50	45,000
Colorado, l.g.s	Utah	0.08	80,000
Elkton Con., g.	Colo.	0.01½	37,500
Golden Star	Ariz.	0.05	20,000
Homestake, g	S.Dak.	0.50	109,200
National Mining	Nev.	0.01	7,000
Sioux Con., s.l.g.	Utah	0.07	52,247
U. S. INDUSTRIALS.	**Location.**	**Amt. per Share.**	**Amt Paid.**
Internat'l Nickel, pf.	U. S.	$1.50	$133,689
Internat'l S. & R.	U. S.	1.50	
Jeff. & Cl'f. C. & I., pf.	Penn.	2.50	37,500
Republic I. & S., pf.	Ill.	6.75	1,378,140
U. S. Steel Corp., pf.	U. S.	1.75	6,304,919
Va. Carolina Ch., Con	U. S.	3.00	839,532
FOREIGN MINING COMPANIES.	**Location.**	**Amt. per Share.**	**Amt. Paid.**
Buffalo Mines, s	Ont.	$0.03	$27,000
Cobalt Central, s	Ont.	0.01	47,615
Dolores, g.	Mex.	0.15	60,000
Lucky Tiger Com., g.	Mex.	0.80	52,000
Mines Co. of Amer.	Mex.	0.03	60,000
N. Y. & Hond. Ros.	C. A.	0.10	15,000

According to the *Queensland Government Min. Journ.*, May 15, 1909, the miners in Germany have been receiving an old-age pension of 11c. per day since 1890. This pension is begun when the miner is 71 years of age.

New Publications

A HANDBOOK FOR FIELD GEOLOGISTS. By C. W. Hayes, Ph.D., chief geologist, U. S. Geological Survey. Pp. 154, illustrated, 4¾x7 in., leather, $1.50. New York, 1909: John Wiley & Sons.

THROUGH THE YUKON AND ALASKA. By T. A. Rickard. Pp. 392, illustrated. 6½x9¾ in., cloth, $2.50. San Francisco, 1909: Mining and Scientific Press.

This interesting book is written in the author's best style. It records observations made in a journey to Alaska in 1908, and is a nontechnical description of the region and its mining industry. It is a book that may be well recommended both to professional men and to laymen. Both will read it with pleasure.

HISTORY OF THE CLAY-WORKING INDUSTRY OF THE UNITED STATES. By Heinrich Reis and Henry Leighton. Pp. 280; 5¾x9 in.; illustrated. Cloth, $2.50 net. New York; John Wiley & Sons.

The materials for this work were collected for the department of economics and sociology of the Carnegie Institution of Washington for use in a projected series of "Contributions to the Economic History of the United States." This advance publication is by the permission of the late Carroll D. Wright, who was the director of the department. Edward W. Parker, of the United States Geological Survey, a collaborator of Dr. Wright, has had the more immediate supervision of the present work and has approved the manuscript for this volume. In the preparation of this work the authors have consulted all available magazines, private publications and Government and State reports. Those which have served as sources of information are listed at the end of the work, but they do not represent more than one quarter of all the works consulted. The data obtained from these publications have been supplemented by inquiries addressed to the different State geologists, and a very large number of producers, as well as private individuals who it was thought might be able to supply any of the desired facts. In the arrangement of the volume the main treatment of the subject is by products, but as this leaves gaps here and there, it has been followed by a discussion by States. It has, of course, been impossible to refer to every deposit or factory in the country, only the more important ones being mentioned, and this chiefly for pointing out the development of the industry at different points. For this purpose it has also been necessary to mention some of the smaller plants as well. Developments in manufacturing methods are sometimes referred to, but it should be understood that the discussion of technologic details is not one of the main objects of the work. Since the primary object of the work is a discussion of the history of the industry, details relating to the mode of occurrence and distribution of the clays are omitted; moreover, such details have already been published elsewhere in Geological Survey and private publications.

SECOND REPORT ON THE GOLD DEPOSITS OF GEORGIA. By S. P. Jones, Assistant State Geologist. Being Bulletin No. 19, Geological Survey of Georgia. Pp. 284; 6½x9½ in.; illustrated. Cloth. Atlanta, Ga.; State Printers.

The gold mines of Georgia are the oldest in this country, and prior to the discovery of gold in California, they, with the mines of North Carolina, furnished the entire gold output of the country. Though now of relatively small importance in comparison with the mines of the Rocky Mountain and Pacific Coast States, they are interesting geologically and historically, besides presenting opportunities for profitable exploitation in the future. That the mines worked have been chiefly small, does not prove that there are not still opportunities for success in the working of low-grade ores; especially as conditions as to labor, climate and fuel supply are exceptionally favorable. The report opens with a statistical and historical introduction, which is followed by a consideration of the different types of deposits; their geographical and geological distribution; their geology and probable genesis. Thus is followed by specific descriptions of the different gold-bearing belts, including many references to individual properties. The most important and best known of these is the Dahlonega belt in Lumpkin and adjoining counties. The production of this belt was so important that one of the earliest branches of the United States mint was placed at Dahlonega, where it was in operation for many years, up to the outbreak of the Civil War. The report is illustrated by a general map of the State and one of the Dahlonega district, and by a number of halftone engravings of different mines and mills.

ANTIMONY: Its History, Chemistry, Mineralogy, Geology, Metallurgy, Uses, Preparations, Analysis, Production, and Valuation; with Complete Bibliographies. By Chung Yu Wang. Pp. 217, illustrated 5½x8½ in.; cloth, $4. London, 1909: Charles Griffin & Co., Ltd.; Philadelphia, J. B. Lippincott Company.

The author of this book states in his preface, "A metallurgical work in English by a Chinese author is unusual." However, in this case a long residence in America, and in Great Britain and other parts of Europe, besides much study of English literature have familiarized the author with the English language and encouraged him to make it the medium for the presentation of his work to the professional men of the world. It is particularly interesting to note that the author expresses his thanks to Professor Kemp, of Columbia, for his valuable guidance, and to Professor Kemp he dedicates his treatise.

As to the intrinsic value of his work, it is worth while to mention that Mr. Wang has had a good deal of practical experience in the metallurgy of antimony, particularly in connection with the volatilization process of Mr. Herrenschmidt and has previously been known for his technical contributions respecting this subject. At present he is engaged in the construction and operation of antimony smelting works in China.

Heretofore the literature as to the metallurgy of antimony has been scattered through the pages of the technical periodicals and the transactions of the societies. It is, therefore, particularly gratifying now to have in concise book form an uptodate treatise upon the metallurgy of this interesting metal.

THE MINING LAW OF CANADA. By Alfred B. Morine. Pages, 740; 6¼x9¼ in.; sheep. Toronto, Ont.; the Canada Law Book Company, Ltd., and Philadelphia; the Cromarty Law Book Company.

This book furnishes a summary of the mining law which was much needed, and which will be exceedingly useful to miners and mineowners in the Dominion. It is now over 10 years since any general work on the mining law was published; and in that time new laws have been passed in nearly all the Provinces, new regulations have been made, and many decisions have been made by the courts. The author reviews the general law, treating in successive chapters, of mining terms; laws now in force; Crown titles; rights of owners, individuals, partnerships and corporations; contracts, licenses and leases; leasements and fixtures; taxation and registration; wrongful abstraction and criminal offenses; and employer's liability. An appendix gives the mining laws of British Columbia, Ontario and Quebec; the mining laws and regulations of the Dominion, including those of a general character and those specially relating to the Yukon territory and to Indian lands. The book is completed by a glossary of terms, a full index to subjects and a separate index to cases to which references are made in the text. Like our United States law, the laws of Canada relate in large part to titles and the methods of locating and acquiring mining lands; though the Ontario and British Columbia acts provide rules as to ventilation and to methods of operation to secure safety to persons and property. The author has provided an excellent summary of the law as it exists at present, in general written clearly and in such a way as to be readily understood by the layman as well as the lawyer.

Personal

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

J. M. Clements has returned from a Western trip.

W. M. Brewer has returned to Victoria, B. C., from Valdez, Alaska.

Dr. James Douglas is expected home about the middle of September.

J. Parke Channing has returned from Europe and has gone to the West.

R. G. Edwards Leckie, of Sudbury, Ont., was at Vancouver, B. C., lately.

O. H. Bergstrom, of Butte, Mont., has been examining some mines in Idaho.

Sir Sandford Fleming, of Ottawa, is at the head of the new Canadian cement combination.

James A. Cunningham has returned to Salt Lake City, Utah, from an extended trip to Mexico.

Henry F. Lefevre is making a study of the territory tributary to the Guatemala railroad in Guatemala.

F. F. Sharpless has gone to the West on professional business that will occupy him for several weeks.

E. P. Arthur, Jr., of Cripple Creek, Colo., has been examining mines in Gunnison county in Colorado.

James Hoatson, president of the North Butte Mining Company, is at Butte, Mont., looking over the property.

A. W. Constans is manager for a syndicate which lately purchased the Athabasca gold mine, near Nelson, B. C.

Albert Miller, who has traveled extensively in search of pitchblende, has been visiting the Cobalt district in Ontario.

Floyd Harmon has resigned the management of the Cochrane mine, Cobalt, Ont., to take charge of the Harmon syndicate mines.

Prof. E. C. Holden, of the University of Wisconsin, who has been spending the summer at White Plains, N. Y., has returned to Madison, Wis.

C. L. Hower, of Vintondale, Penn., after visiting coal mines in the Crow's Nest Pass district, British Columbia, has gone to Kananaskis, Alberta.

Louis Pratt, of Nelson, B. C., and W. H. Bassick, of San Francisco, are examining a dredging prospect in the Cariboo district of British Columbia.

H. W. DuBois is in Cariboo district, British Columbia, in connection with the construction of a 15-mile ditch to a placer gold property on Quesnel river.

Geo. H. Dickson, formerly mining engineer for the International and Royal Collieries companies, in Alberta, has returned west from a visit to Nova Scotia.

Charles Graham has been appointed mine manager for the Vermilion Forks Mining and Development Company, which is opening a coal mine at Princeton, Similkameen, B. C.

Hallet R. Robbins is in charge of the development work the Colonial Gold Mining Company, of Manchester, N. H., is doing on the Apex group, Hedley camp, Similkameen, B. C.

Frederick H. Morley left Denver, Colo., Aug. 24, for Chihuahua, Mexico, to make examinations of some mines in that State. He expects to return to Denver about the middle of September.

Walter Harvey Weed has severed his connection with the General Development Company. At present he is in Washington completing his Butte report for the U. S. Geological Survey.

Kirby Thomas, secretary of the Mexican Institute of Mining and Metallurgy, who has been correspondent for the JOURNAL in the City of Mexico, is to join the regular editorial staff in New York.

C. T. Fairbairn, Duluth, Minn., has been appointed manager of the mining division of the Republic Iron and Steel Company. He was formerly manager of mines for that company in the Lake Superior district.

Howland Bancroft, of the U. S. Geological Survey, has been engaged during the summer in obtaining data relative to the geology and mineralogy of mining districts in the northeastern part of Washington.

William Dempster, of Jas. McGregor & Co., Glasgow, Scotland, has been looking over mines on Texada island, B. C. Accompanied by his son, G. P. Dempster, who is also a mining engineer, he has gone to Yukon Territory.

C. L. Constant, Walter Harvey Weed, C. L. Constant, Jr., R. B. Lamb, and Frank H. Probert have united in the C. L. Constant Company as consulting specialists in geology, mining and metallurgy, with offices at 42 Broadway, New York.

George D. Harrington, who, for over two years past represented the J. Geo. Leyner Engineering Works Company, of Denver, in Mexico, is now associated with the Aguacate Mining Company, and sailed, Aug. 26, for San Mateo, Costa Rica, by way of Port Limon.

George R. Wood and Harry F. Randolph have incorporated the Wood-Randolph Company, electrical mining engineers, with office in the Park building, Pittsburg, Penn. Both have had much experience, having been connected with the General Electric Company, the Pittsburg Coal Company and other coal companies.

Obituary

Morgan Tillinghast, a mining engineer, died suddenly at Islip, N. Y., Aug. 30. He was 30 years old and a resident of Philadelphia.

William S. Morrow died in Westfield, N. J., Aug. 27, aged 79 years. He was born in Maryland and for many years practised as a mining engineer. He had worked at different times in nearly all the States of the West, and was one of the first American engineers to conduct explorations in Mexico.

John Moorhead died at his home near Gas City, Venango county, Penn., Aug. 29, aged 77 years. He was one of the earliest oil operators in the district and was active for a number of years, but retired some years ago.

Norman Buck died at Spokane, Wash., Aug. 25, aged 76 years. He was born in New York, but went West as a young man and practised as a lawyer in several States. He was known to mining men for his decision on the ownership of the claims now owned by the Bunker Hill & Sullivan Company, given in 1885, when he was a judge of the Supreme Court of Idaho.

Societies and Technical Schools

University of Tennessee—During the summer vacation a number of alterations and additions have been made to the building and equipment in the mining department of this university. This department was established only two years ago, and has been assigned the exclusive use of the first floor and basement of the building formerly occupied by the department of agriculture and now known as Carrick Hall. The entire building has been thoroughly overhauled in order to fit it for its new uses. The aggregate floor area on the first floor is about 3600 sq.ft., divided into nine rooms: a large lecture room, drafting room, museum, library, general metallurgical laboratory, store room, dark room, private laboratory and office. The basement, having an area about 1800 sq.ft., contains the assaying and ore-dressing laboratory. The assay laboratory is provided with the usual equipment of coal, coke and gas furnaces, balances, etc. The ore-dressing laboratory contains the following pieces of apparatus: A Braun laboratory crusher, a 3x6-in. Sturtevant roll-jaw crusher, a set of 5x8-in. Sturtevant rolls, an 8x12-in. adjustable laboratory jig, and a Card table of intermediate size. The Card table is intended to be run in connection with an Allis-Chalmers hydraulic classifier, Callow dewatering cone, Hodge centrifugal sand pump and settling tank. Thus equipped, a small quantity of ore can be tested upon the table under varied conditions and for any length of time. Space is reserved for a Frue vanner or another machine of similar type, and the same adjuncts used in connection with the Card table are intended to serve the second machine. All machines are driven by electric motors. Facilities are provided for making experiments with small-sized laboratory apparatus in the sorting and classification of ores.

Special Correspondence from Mining Centers

News of the Industry Reported by Special Representatives at Butte, Denver, Salt Lake City, Goldfield, Cobalt and Toronto

REVIEWS OF IMPORTANT EVENTS

San Francisco

Aug. 27—Considerable old-fashioned rocker mining is being done on the middle and north forks of the American river this season. A number of the old bars which paid well years ago are again being worked. In some cases the men are getting from $7 to $9 per day but generally the pay is less. The floods in the river have been concentrating the river sands for some years, so that a time has come when these old bars could be made to pay again with the old-time rocker. A great deal of gold is still taken out in this State with this primitive appliance.

The Standard Consolidated Mining Company at Bodie, Mono county, is enlarging its power plant on Green creek so that sufficient power may be generated to operate large electric pumps in the proposed deep mining operations. On the Standard mines there are two shafts, each 1200 ft. deep, but the Standard has not been worked below the 600-ft. level for some years on account of the volume of water encountered. Now large electric pumps are to be installed to handle this water and permit deeper mining to be done than at present.

It is understood in Nevada City that work will soon be resumed on the old Murchie mine. While there has been no underground work done since the financial entanglements of the company, the mine has been kept free of water and could readily be reopened. It was closed down last January for lack of money to continue operations.

The Phoenix mine at Hurleton has a narrow vein, but the quartz is exceedingly rich. A little three-stamp mill is turning out about $1000 per day. The pay shoot has been worked for some months and still continues.

There are now prospects that the famous Utica mine at Angels Camp in Calaveras county may shortly change ownership. With the Utica will go the water system of reservoirs, ditches, flumes, pipe lines, etc., the most extensive connected with any quartz mine in the State. These water-power plants are now becoming more and more valuable every year. Water power was of the greatest importance to the mines in Calaveras county, and particularly to those at Angels. There are also reports that the Lightner and the Etna King will change hands.

The Trinity River Mining Company will not turn the river through the new tunnel this month, as expected. It is found necessary to strengthen the banks of the ditch at the inlet of the tunnel. Operations on the old river bed will commence next month.

Butte

Aug. 26—Within the last month there have been persistent rumors that the Amalgamated company was planning to bring suits against several mining companies in the Butte district, which it is thought have encroached upon the ore-bodies of the big company. While these rumors have gained in strength, nothing authentic can be learned, and it is only to be expected that no statement will be given out until the suits are actually instituted. Since Heinze sold out there has been very little litigation of this character in the Butte courts and its revival may bring some interesting complications.

In the case of Mohr Brothers, Charles Kinshall and Jacob Baur against the Whitlatch Mining Company, a judgment has been rendered against the company for $216,973, together with $4500 attorney's fees. The suit was brought on the company's bonds held by the plaintiffs.

The activity in the Corbin camp in Jefferson county increases from day to day. The Boston & Alta company is building a large boarding house to relieve its force of the long climb to Corbin. The gallows frame is in position and the two-compartment shaft is sunk about 35 ft. A pole line is being erected to connect with the main Missouri River-Butte line, and it is the intention, on its completion, to provide electric light for the mine and camp, and power for the air compressor and the proposed new hoist. A good body of ore was recently discovered on the Minnesota mine, owned by the Calumet & Corbin Copper Company, in sinking to the 200-ft. level at which crosscuts will be run. The Bluebird continues to ship two cars of ore a week and expects to appreciably increase its output when the rope tramway, now under construction, is finished.

In the Radersburg district in Broadwater county, the Black Friday and Keating are shipping regularly. The Edda is installing a second boiler and preparing to continue sinking. The Ohio is not producing at present, but is expected to ship when repairs on the engine are finished.

Experiments made up to date with the Dwight & Lloyd sintering furnace at East Helena are very satisfactory; the ore mixture, however, has been selected. The results would indicate that the introduction and use of the furnace would reduce smelting costs very materially. Engineers from the Boston & Montana company's smeltery at Great Falls, have been carrying on a test to determine the feasibility of using the furnace for agglomerating copper-ore concentrates.

Denver

Aug. 27—There is considerable "radioactivity" in Colorado, chiefly due to the energy and money of Thomas F. Walsh, who has just sent his check to Dr. Victor C. Alderson, president of the State School of Mines, to help in the search for, and tests of, radium-producing ores. Mr. Walsh has also addressed an open letter to prospectors and mine owners of Colorado, urging them to look for such ores, and send them to the School of Mines, where tests will be made free of charge. This is on a line with similar research in Cornwall, where streets of St. Ives and Levant are being dug up to recover the pitchblende thrown on dumps from the tin mines, and from which, according to report, ¼ oz. of radium has actually been recovered.

It is stated that ground is being broken for a custom tungsten-concentration mill of 50 tons capacity in the Nederland district of Boulder county, and that the Primos Chemical Company, which uses 120 tons of tungsten concentrates monthly, is back of the enterprise. This mill will compete for ore with the Wolf Tongue mill at Nederland.

In the Cripple Creek district, good progress is being made with the deep drainage tunnel, and it is stated by the tunnel committee that all the necessary capital has been subscribed except about $12,000, which it is expected will be raised shortly.

The Waldorf Consolidated Company's group of mines, on Mount McClelland, in the East Argentine district, and which are now developed by the Wilcox tunnel over 5000 ft. in length, at a depth of about 2000 ft. below the surface, are being put in shape for steady production, the 250-ton mill being now in operation. The Stevens mine, now practically worked out, was among the first discovered on Mount McClelland as early as 1868, and worked at that time at the top of what looks like an inaccessible cliff at 12,000 ft. elevation, and was a heavy producer for 20 years. The Belmont and International mines, on McClelland mountain, turned out $100,000 in 1870-1. The Tobin and Commonwealth groups of the Waldorf company have large bodies of silver-lead ores, and cop-

per ores carrying gold and silver, which, under scientific and economic management, are capable of producing a large tonnage at a profit.

Goldfield

Aug. 26—James F. Callbreath, Jr., secretary of the American Mining Congress, has arrived and has opened headquarters for the publicity bureau. Elaborate preparations are being made for the entertainment of the members of the congress who will be in Goldfield for the week following Sept. 27. Discussions of vital interest to mining men will occupy most of the time. Senator Heyburn, of Idaho, it is expected, will criticize the policy of the Forestry Bureau, which will be defended by Senator Smoot. The larger commercial use of silver and other equally important matters will receive attention.

A possible year-end dividend for stockholders of the Goldfield Consolidated Mines Company and the advisability of increasing the capacity of the Consolidated mill are two of the important matters to be considered at the quarterly meeting of the board of directors which will be held the latter part of November. Shipments of high-grade ore to the smelters are to be resumed from the Hampton stope, and will be continued until enough of the high-grade core is removed to enable the management to maintain an even grade of ore at the mill.

Thus far the above oreshoot has been developed for a distance of 150 feet in length, and 75 ft. wide. It is predicted by some that the Combination vein from the Hampton stope to the old Reilly lease, a distance of about 2000 ft., will develop into an immense glory hole to a depth of at least 50 ft. from the surface.

The oreshoot recently encountered on the 733-ft. level of the Clermont shaft, has been penetrated for about 90 ft., and the average value has held close to $30 per ton. As far as developed the ore contains less copper than in the levels above and is more susceptible to the form of treatment used at the Consolidated mill. At the 866-ft. level of the shaft a crosscut is being driven to encounter the same shoot.

Salt Lake City

Aug. 27—Speaking of the rumors that have been current that there were serious cave-ins in the Sioux Consolidated mine in the Tintic district, General Manager C. E. Loose recently said that the caving was in stope No. 1, a part of the mine from which the ore has been extracted. Colonel Loose said that dividends were assured for the remaining months of the year; farther than that he could not say, but stated that there was all of 150 ft. on each end of the orebody. The 100-stamp mill of the Eureka Hill Mining Company in this district is to be torn down and the machinery sold. The reason for its dismantling is that transportation and smelting facilities have become so good in the Tintic district that the mill is no longer necessary.

A cloudburst at Bingham recently caused considerable damage. The creek left its channed and flowed through the streets depositing several inches of mud in a number of buildings. Four piers of the Boston Consolidated tramway were undermined and the roads from the Highland Boy to the New England mill destroyed. One of the reverberatory furnaces at the Yampa smeltery was sufficiently damaged to put the furnace out of commission temporarily.

The ore shipments from Tintic during the week ended August 21 were: Dragon Iron, 7 cars; Iron Blossom, 48; Swansea, 2; Colorado, 40; Beck Tunnel, 4; Sioux Consolidated, 16; Beatrice, 1; Chief Consolidated, 1; Eagle & Blue Bell, 2; May Day (crude), 2; May Day (concentrates), 2; Victoria, 2; Grand Central, 2; Ajax, 2; Centennial Eureka, 40; Uncle Sam, 8; Gemini, 2. Park City ore shipments during the week were: Silver King, 1,783,680 lb.; Daly-West, 1,355,000; Daly-Judge, 658,000; Daly-Judge (zinc), 691,350 pounds.

Duluth

Aug. 25—The prospect for a large output of iron ore on the ranges this year is encouraging. At the port of Two Harbors, over 5,000,000 tons have been shipped this season, being 2,000,000 tons in excess of the corresponding period of last year. The same condition is reported from other places and mining men now estimate this year's output as equal to or greater than 1907. At Hibbing, the Oliver Iron Mining Company is operating twenty-eight 2½-yard steam shovels, one-half of which are stripping while the other half are taking out ore. The milling system of mining has been practically discontinued in the district and replaced by the steam shovel.

The town of Chisholm, five miles northeast of Hibbing, is being rapidly rebuilt with substantial buildings and shows little effect from the fire which destroyed the place last fall. Here the Oliver company is operating 10 mines, the majority of which are underground workings, in which the slicing-caving system is used. The Crete Mining Company at Hibbing is still using the milling system, but has one shovel stripping and one shovel taking out ore around the rim of the pit in which the milling is now being done. A number of the old mines that have been idle for the last two or three years are preparing to resume work this fall. The Nassau mine, two miles northeast of Hibbing, is unwatering its old workings and within three months it will employ about 300 men. This mine is operated by the Pittsburg Iron Ore Company. The Scranton Mining Company has let a contract to the Foundation Company of New York to sink a concrete shaft 100 ft. deep. Work on the shaft has already begun. This is preparatory to active mining operations next spring when underground mining will be conducted. At the Morton mine 1½ miles southwest of Hibbing, the work of sinking the concrete shaft is progressing rapidly. The shaft is now down 160 ft. and it is expected to be completed to 190-ft. level within the next month. This shaft is being sunk through quicksand and it is accomplished by building on concrete from the top and sinking the solid structure by dredging the sand from beneath.

Cobalt

Aug. 27—The results of the diamond drilling on the Alexandria property show that the Huronian slates underlie the diabase at a depth of 250 ft. The shaft is at present down 160 ft., and in a short time sinking will be continued to the 250-ft. level. The good results obtained in this formation by the Cobalt Central has decided the management of the Alexandria to continue the work on the deeper level.

The drift being run on the No. 6 vein of the Cobalt Lake is showing very good results. At the present time the vein is from 6 to 8 in. wide, and carries high-grade ore. Where the vein was first cut it was only about 2 in. wide.

During the week two more veins have been discovered on the Nipissing by surface prospecting. They are known as No. 129 and No. 130. The former is from 1 to 2 in. wide and carries high-grade ore. The latter was found about 300 ft. to the north of 129, and has been stripped for about 50 ft. It varies in width from 2 to 6 in. of high-grade ore. Both these veins carry considerable argentite.

The Waldman property on the Gillies limit and the Goulds Consolidated at Cart lake will lease air from the Provincial mine until that property is sold. On the Waldman vein a shaft has been started, and is now down a little over 10 ft. On the Martel claim in the limit twenty men are engaged in trenching, and a narrow smaltite vein has been located.

The dispute between the Peterson Lake and Nova Scotia companies has culminated in a writ being issued against E. & D. M. Steindler, in which the Peterson Lake people claim: (1) $1,000,000 as the amount of plaintiff's stock wrongfully issued to the defendants; (2) $50,000, being money of the plaintiff wrongfully appropriated by the defendants; (3) in the alternative, like sums by way of damages for misfeasance and breach of trust on the part of the defendants, as trustees for, and directors and officers of the plaintiff. The company further asks for the

delivery and cancelation of stock certificates held by the defendants, and an injunction restraining them from voting or marketing their shares, or acting as directors of the plaintiff company.

Contracts have been let for supplying all the necessary electrical equipment for doubling the concentrator at the Coniagas Mines. A short time ago work was started on the White Silver property, which lies to the south of the Nova Scotia, and twenty men are at work doing development. A small vein has been discovered near the boundary of the Michigan Cobalt. A general shareholders' meeting of the Floyd Mining Company was called for August 25 to authorize the sale of the company's property to the Temagami Reserve Mines, Ltd., in consideration of 800,000 shares of the capital stock.

During the last week the following mining companies have obtained charters: Blind River Exploration and Mining Company, Ltd.; headquarters, Blind River; capital, $25,000. Harman Mining and Leasing Company, Ltd.; headquarters, Cobalt; capital, $500,000. Wealthy Mines, Ltd.; headquarters, North Bay; capital, $1,000,000. Prospectors Exploration and Development Company; headquarters, Toronto; capital, $300,000. Brewster Mining Company, Ltd.; headquarters, Toronto; capital, $10,000. Atlantic Silver Mines, Ltd.; headquarters, Cobalt; capital $40,000. Hamilton Febre Mining Company, Ltd.; capital, $2,000,000. The Silver Cross Cobalt Mining Company has been authorized to change its corporate name to the Silver Cross Mines, Ltd., and to increase its capital from $500,000 to $1,000,000.

Toronto

Aug. 27—Two coal-mining companies, both controlled by Mackenzie & Mann, of the Canadian Northern railway, have been incorporated at Ottawa, the Brazeau Collieries, Ltd., and the Rocky Mountain Collieries, Ltd., each capitalized at $1,000,000. The Brazeau Collieries will operate an area of coal lands, about 4000 acres in extent, on the Brazeau and Macleod rivers in Alberta, about 175 miles west of Edmonton. Surveys are being made with a view of connecting the mines with the Canadian Northern system, which now extends some distance west of Edmonton. The Rocky Mountain Collieries owns a tract of several thousand acres on the Kananakis river, Alberta, in which Mackenzie & Mann are acquiring an interest. Both fields will supply bituminous coal, of good grade, and will be worked mainly, or altogether, as a source of supply for the Canadian Northern system as soon as connection can be made. Both companies will be close corporations with William Mackenzie as president.

Mexico

Aug. 24—The political situation in Mexico is reaching an acute stage, but everybody feels that the government has a firm hand on affairs, and that there will be no disturbance that will endanger life or property, although the principal agitators of the Reyistas are finding themselves in more or less trouble in all parts of the republic. The situation is watched with a good deal of interest by the foreign investors, and it is known that some large deals have been waiting the outcome of the present program. However, the general situation is quite satisfactory, and there are considerable negotiations in connection with land and mining business, principally from American and English sources. The uncertainty and doubt of the Mexican situation will continue for some time. The election is not held until a year from September. President Diaz in September will be 80 years old. He is hale and vigorous, and has demonstrated that he has a firm hold of the governmental affairs.

Mexican congress will convene September 16, and the new mining law will come up for action in the senate. It is not expected that there will be any radical changes in the law as passed by the chamber of deputies. A movement is on foot to have included in the mining law a provision for tunnel-exploration companies. The old law, and likewise the pending measure, are lacking provisions granting rights to tunnel companies, either the right of way, or the right of assess benefits on property in the course of the tunnel. The tunnel law of 1884 contained favorable provisions in this respect, and it is planned to enact a similar law if possible. This movement has the support of strong interests, and it is considered a very desirable one in connection with the development of some of the big camps.

The deal for the sale of La Blanca mine at Pachuca is apparently off. The owners say that the reason is the exorbitant commissions demanded by the intermediary parties in the deal. It is claimed that one party concerned in the contract wanted one million of the six million pesos purchase price. The work of a detailed examination and survey of the Santa Gertrudis is still being carried on by engineers for the purchasing parties, which is the reason for the expectation that the Santa Gertrudis sale may go through independent of La Blanca. The Santa Gertrudis company has officially authorized the acceptance of earnest money on the deal but as far as is known here, none has been put up, although the purchasers were ready some time ago to make a substantial deposit.

The El Oro mining companies in the state of Mexico are installing steam-turbine equipments as auxiliary power. The district is provided with electric power from the Necaxa plant in the state of Puebla, which also supplies Mexico City. During the past season there have occurred some accidents at the power plant and the new power plants at El Oro are to provide against a repetition of such contingencies. The companies are guaranteed regular power under a contract which provides a heavy penalty to the power company for any stoppage.

The concession for a railroad from some point in Michoacan, probably a connection with the National lines to the Pacific port of Sihuatanejo in Guerrero, has been acquired by English interests and it is said the road will now be built. It will pass through Uruapan, where are the important copper mines belonging to the French Rothschilds, and will cross the Balsas river, passing near the Pacific Copper Company's mines at La Union. The Pacific terminus is a very good harbor. The road will serve a rich agricultural country and afford facilities for a mining section of large possibilities.

London

Aug. 18—With regard to the diamond industry in which the Central Mining and Investment Corporation has an interest, Sir Julius Wernher, the chairman of the company, gave some interesting information at the recent general meeting. He informed the shareholders that both De Beers and Jagersfontein had at the present time not a single unsold diamond, and that he was informed that other producers, of which the Premier is the most important, have also no stocks of consequence. The diamond trade is now recovering from the collapse in 1907, due to the American business crisis, when there was almost complete and quite unprecedented stoppage of sales. The exports to America, which during the first 10 months of 1907 had averaged about £520,000 per month for rough and cut diamonds, fell in November to £170,000, and the average for the next seven months up to June, 1908, was £67,000 per month, the lowest month being only £35,000. Since July, 1908, a steady improvement has been noted, and for the last three months the sales have averaged over £400,000 per month, and trade is becoming normal.

The Central Mining and Investment Corporation made a profit for the year of £553,516, out of which a dividend of £1 per £12 share was declared, absorbing £300,000. The sum of £100,000 was allotted to a reserve fund, and £93,342 was carried forward to next year's accounts. The managers and French directors take about £60,000 under certain agreements, a handsome remuneration which is out of proportion to the amount distributed to the shareholders and shows that the Rand financiers are well able to take care of themselves. Apparently, if the company does not pay a dividend the directors are not paid, but if it does—and the chances are all that way—they profit to an extent seemingly out of all proportion to the services rendered, and certainly out of proportion to what the shareholders receive.

Mining News from All Parts of the World

New Enterprises, Installations of New Machinery, Development of Mines and Transfers of Property Reported by Special Correspondents.

THE CURRENT HISTORY OF MINING

Alaska

Nome—The heavy rains of the first part of August will prevent the threatened failure of the season in this section. Many have now returned to the creeks and the city is almost deserted by the throngs of idle men recently gathered here as a result of the enforced idleness caused by lack of water.

Cordova—Great progress is being made in this district, and word just received relative to the work done this summer shows that some valuable ground is being opened up. Among the successful operations are the Tammany bench claim, owned by Peter Monahan, Carlson and Nealy, the Oregon & Susitana Mining Company, at the head of which is Dan Kain, and William Grogg and partners, who are working on Valdez creek with excellent results. This year promises to be a good one for this entire district.

Arizona

COCHISE COUNTY—TOMBSTONE

Tombstone Consolidated—Work of installing the new 7000-cu.ft. compressor is rapidly nearing completion. At the 800 level preliminary work in cutting the 40x100-ft. station is being done. Two 1200-gal.-per-min. pumps will be installed at this point. Three or four cars of ore are being shipped to El Paso smeltery each week.

Hershall—This property, managed by Douglas Grey, is shipping regularly.

GILA COUNTY

Arizona Commercial—The new copper-smelting plant is nearing completion, and, it is expected, will be blown in about the middle of October. The ore and coke bins are practically finished and the machine shop, power house and warehouse are already completed.

Inspiration—The Joe Bush shaft is now down about 390 ft., and continues in good ore.

Superior & Boston—About 70 men are engaged in development and a force is also at work installing the new equipment. The hoist is now in place at the McGaw shaft, and as soon as the new compressor is installed, sinking will be resumed at this shaft, now bottomed at 480 feet.

PINAL COUNTY

Lake Superior & Arizona—Development work at the Superior is advancing, the incline shaft having reached a depth of 1250 ft. Twenty-five men are being worked three shifts. Work will be resumed in the Silver King as soon as control can be bought by Fisk and associates in Globe.

California

BUTTE COUNTY

Oro Light, Power and Water Company—The Empire dredge of this company at Oroville sunk, last week, and considerable damage was done to it.

INYO COUNTY

Inyo Mines Syndicate—The company is sinking two shafts on the Phonolite claim in Hummer district, seven miles east of Olancha. The ore so far found is of high grade carrying both gold and silver.

KERN COUNTY

Butte—This Randsburg mine is being worked under lease by Ed. Shipsey, who recently cleaned up $3702 from 36 tons crushed and has now recovered $2350 from 27 tons of ore.

MADERA COUNTY

Fresno Flats—The gold excitement at this place continues and upward of 50 locations have been made. These are all quartz claims though the district has heretofore been known mainly as a placer camp.

NAPA COUNTY

Napa Consolidated—The annual report just issued for the year ended Dec. 31, 1908, shows a production of 2320 flasks of quicksilver. Prospecting during the year failed to disclose any new orebodies of importance.

NEVADA COUNTY

Eagle Bird—The 30-stamp mill on this property, four miles from Washington, has been entirely destroyed by fire. The property is owned by W. M. Wilson of Cherokee, Butte county.

North Star Mines—This Grass Valley company has purchased the old Hermosa mine adjoining its holdings. The Hermosa has been idle many years.

Fairview—The contract for the new 20-stamp mill of this mine at Relief hill has been awarded to the Miners' Foundry and Supply Company, of Nevada City. George A. Nihell has charge of construction work.

SHASTA COUNTY

Mammoth Copper—The company has 99 men at work in the Quartz Hill mine and 300 tons of quartz are daily shipped to the smeltery.

Calumet—The mine in Old Diggings district is being worked under bond by the Balaklala interests. Henry Bush, superintendent.

SIERRA COUNTY

Twenty-One—At this property, Alleghany, F. M. Phelps, manager, the force has been increased and a drift will be run on the vein to the south. The old shaft is to be unwatered.

Oriflamme—At this mine on the Chipp's Flat ridge, a bedrock tunnel has been started for the gravel channel under the lava-capping.

Four Hills—Manager Van Fleet has a large crew of men reopening this mine at Downieville, and the power house is being rebuilt. The mine was formerly a producer.

SOLANO COUNTY

St. Johns Quicksilver Mining Company—This company, near Vallejo, of which A. A. Tregidgo is manager, is planning to do away with its two coarse-ore furnaces and bench of 24 retorts and install a large furnace of the type in use at the New Idria quicksilver mines, San Benito county, which is very successful.

Colorado

CLEAR CREEK COUNTY

Joplin—Manager B. J. O'Connell states that this property on Republican mountain will soon start shipments of both smelting and milling ore. High-grade lead ore was recently encountered in the east drift of the Gambetta vein.

LAKE COUNTY—LEADVILLE

Garbutt—The mine on Breece hill is continuing its excellent record. Improvements in machinery have been completed and an air compressor and electric hoist are in operation. Several bodies of good-grade copper sulphide are exposed from which shipments are being made and the shaft will be sunk, following the trend of the ore.

Tenderfoot—Lessees on the property in South Evans gulch continue to output a small quantity of desirable lead ore. While shipments have been somewhat curtailed from this mine, there is every prospect of again reopening the old chute on a different level.

Corinne—A force of men are now employed on this and adjoining claims on Corinne mountain, which were recently taken under lease by Thomas F. Walsh, of Denver. The ground will be thoroughly prospected.

OURAY COUNTY

Camp Bird—The monthly report from London states that, during July, the mill ran 29 days and crushed 6187 tons, yielding 10,697 oz. of bullion and 640 tons of concentrates. Sales of product brought $318,291 and $53,544 was expended in operating the property. About 692 ft. of development was done during the month.

TELLER COUNTY

Pride of Cripple Creek—The leasing company operating on this mine has encountered a streak of rich quartz covered with calaverite while drifting in ore of fair value at the 620-ft. level. Fred Johnson, manager.

Twin Sisters—The mine on Raven hill has been leased by R. P. Russell and associates, of Colorado Springs. It has been idle for some time.

South Burns—A station is being cut at a depth of 1100 ft., preparatory to driving to catch the Shurtloff vein. Two cars per week are being shipped. Charles Crowder, manager.

Idaho

COEUR D'ALENE DISTRICT

Monarch—As a result of extensive development, carried on while awaiting railroad connections for the north side of the Coeur d'Alenes, the tonnage now exposed has warranted the company in planning to double the concentrating mill on the property, east of Murray.

LATAH COUNTY

Hoodoo—A discovery of rich placer ground is reported from this old mining district east of Palouse, Wash. The strike was made along the Palouse river at the mouth of White Pine creek.

Indiana

GREENE COUNTY

Big Vein Coal Company—Work has been resumed at the mine near Coalmount. This mine was closed down for several months owing to the tipple being blown down during a heavy storm.

GIBSON COUNTY

Knox Coal Company—A serious dispute has arisen at the mine because the miners are not permitted to clear up coal which they have left, or obtain payment for their work. It is alleged that the mineowners recently discharged several miners and refused to let them load the coal out or pay the scale for mining it. The Mine Workers' officials are investigating the complaint, and it is said that conditions are such as to demand an immediate settlement.

Kentucky

HARLAN COUNTY

A tract of 14,000 acres of coal land has been sold to the Keokee Consolidated Coke Company, which expects to open coal mines and build coke ovens.

Maryland

ALLEGANY COUNTY

Consolidation Coal Company—An opening has been made through the drainage tunnel between Ocean No. 1 and No. 2 mines. This tunnel, which is five miles long, is being cleaned out and timbered. It is the largest of a system of drains, and will open into the drainage tunnel at Hoffman mine, which empties into a run at Clarysville, and by the way of Braddock run comes to Wills creek a few miles above Cumberland, flowing on down to the river at Cumberland. The tunnels are 8x8 ft., and the entire system will be about 8½ miles long. When completed it will do away with an expensive pumping system that has been maintained at the mines of this company for years. It will bring down past Cumberland a quantity of water that has been heretofore pumped into Georges creek and has emptied into the Potomac at Westport.

Michigan

COPPER

Franklin—The company has discontinued operations at No. 2 Conglomerate shaft and is directing its attention to the Pewabic lode on the Junior property. No. 1 Pewabic shaft is down below the 26th level and from that level the crosscut has cut the lode and drifting is now in progress. Drifts are being extended from various levels from the 20th down and good rock is being exposed, with an occasional streak of poor ground.

New Arcadian — The company has started diamond-drill work under the supervision of Herman Fesing. The first drill hole will be put down in close proximity to the exploratory shaft that was started a few years ago. This drill will go down at an angle of about 60 deg., and it is calculated that the formation, the northern extension of the Baltic lode, will be encountered at a depth of about 1200 ft. The property to be explored covers about 2½ miles of virgin ground.

Ahmeek—A mill test of about 500 tons daily is being made at the Calumet & Hecla mills on this company's rock. This is a part of the test that is being carried out by the Calumet & Hecla company on the treating of rock from the various companies now under its control.

LaSalle—The new shaft that this company is sinking on the Kearsarge lode, known as No. 2 Tecumseh, is down about 85 ft. The hoisting equipment from the abandoned No. 2 Caldwell shaft has been delivered to this shaft and is being assembled. No. 1 Tecumseh shaft is opening rich ground at the 11th level.

New Baltic—The company is experiencing a great deal of difficulty in getting the sand pipe, through which the drill operates, down to bed rock, owing to the presence of large boulders. This hole, No. 2, will go down at an angle of about 45 deg., or approximately perpendicular to the formation. The first hole was put down about 325 ft., but passed out of the mineralized zone.

North Lake—The management has abandoned the No. 3 drill hole, as the ground is so broken that a core cannot be extracted. This hole was drilled to strike the Conglomerate and Adventure lodes and continued with an idea of cutting the Lake lode.

IRON—MESABI RANGE

Higgins—The property of the Higgins estate has been put in charge of M. E. Richards to be thoroughly prospected by drilling. The work will extend over all the lands which are not already leased to the Oliver Iron Mining Company.

Minnesota

IRON—VERMILION RANGE

Vermilion Iron and Steel Company—This company has begun extensive exploration and development work on section 5-62-14, near Tower. Drilling is said to have indicated the existence of a large orebody, and two shafts are to be sunk.

Montana

BUTTE DISTRICT

Amalgamated Copper—After a shutdown of over two weeks, owing to a broken driving shaft in the hoist, the Boston & Montana company's Mountain View mine has resumed operations and is now hoisting its usual tonnage. At the Badger State mine, the station on the 1300-ft. level is not quite finished. The company now plans to open up the old Moose mine, just west of the Badger State. The property was formerly worked to a depth of 400 ft., as a silver mine. It will be operated through the Badger State, and with this end in view a 100-ft. raise has been run from the 200-ft. level of the latter mine to connect with the 300-ft. level of the Moose.

Davis-Daly—Sinking on the 4-compartment shaft of the Colorado mine has recently been resumed. A depth of 1630 ft. has been reached and sinking will be continued at least to the 2000-ft. mark. About 150 tons of ore, all from the 1400 level, are being shipped to Anaconda, daily. Two hundred men are employed.

Butte & Superior—At a recent directors' meeting it was decided to construct the proposed 300-ton zinc concentrator at

the mine. The contract calls for the completion of the plant within five months. This action was taken after consideration of the report of R. M. Atwater, Jr., of Duluth.

East Butte—The management states that during the month of July, the company produced 525,000 lb. of blister copper, and this, together with 16,000 oz. of gold and silver, gave a slight net profit for the month.

Nevada

ESMERALDA COUNTY—GOLDFIELD

Goldfield Consolidated—At the quarterly meeting of the board of directors, held at Chicago, Aug. 26, A. H. Howe, of Goldfield, Nev., was elected director to succeed Charles Hayden, resigned. Vice-president Hubbard stated that no action had been taken concerning the throwing open of some of the company's undeveloped acreage to leasers. The quarterly dividend of 30c. per share, about $1,067,500, was declared payable Oct. 31, to stockholders of record Sept. 30.

ESMERALDA COUNTY—LUCKY BOY

The local union of the Western Federation of Miners is trying to cause friction between miners and operators in this camp. The miners have been receiving a minimum of $4.50 per shift, and are now demanding $5. The operators refuse to consent to the increase.

McCormick Lease—A carload of the highest-grade silver ore ever shipped from the camp was made during the past week from the Broken Hills property.

ESMERALDA COUNTY—RAWHIDE

It is reported that Dr. E. A. Wheeler, S. Canman and I. H. Cook have acquired the Murray 10-stamp mill, full control of the Victor lease on the Coalition estate and a portion of the ground covered by the Proskey No. 1 lease.

King-Heisner—The newly completed mill and sampling works have been purchased by the Coalition and Queen Mines companies. E. W. King, president of the purchasing companies, was elected vice-president of the National Ore Purchasing Agency.

Black Eagle—This group of 12 claims has lately been bought by E. W. Heward; it is understood that the purchase price was $57,000. The main shaft is now down 200 ft. and ore is being shipped to the mills.

Grutt-Balloon Hill—On this lease, crosscutting for the main vein on the 250-ft. level is in progress.

NYE COUNTY—TONOPAH

Ore Shipments—For the week ending Aug. 21 ore shipments to the mills were: Tonopah Mining, 3500 tons; Belmont, 950 tons; Montana-Tonopah, 912 tons; MacNamara, 450 tons; West End, 150 tons; Midway, 100 tons; total, 6062 tons, of an estimated value of $151,550.

Montana-Tonopah—The semi-monthly melt of cyanide precipitate returned 29 bars of bullion. While repairs were being made to the compressor and hoist, the old steam equipment has been used.

Tonopah Mining—A new compressor has been installed. The Mizpah shaft is to be continued 18 ft. below the 1500 in order to make a sump. A pump station is to be cut on the 1500-ft. level.

WHITE PINE COUNTY—ELY

Giroux—It is reported that a 1000-ton smeltery will be built to treat the high-grade ore of the Alpha shaft.

Nevada Consolidated—The output of ore from the steam shovel pit at Copper Flat for the past week has averaged close to 7000 tons per day. During the first 16 days of August, the smeltery produced 3,000,000 lb. of blister copper.

WHITE PINE COUNTY—OSCEOLA

Tungsten—A group of 25 contiguous claims on the west slope of Mount Wheeling about 12 miles south of Osceola, have been purchased by O. A. Turner, president of the Ely Central Copper Company.

Oregon

JOSEPHINE COUNTY

Waldo Copper—About 50 men are reported to be employed about the mine and camp. Development work is in progress, and ore is being put on the dump.

Buckeye Mining and Smelting—This and the National Copper Company, together holding over 40 claims, have two diamond drills at work prospecting their property.

Pennsylvania

BITUMINOUS COAL

Pittsburg Coal Company—The negotiations with the miners over the question of mining the new explosives adopted by the company have failed to secure any agreement, and on Aug. 28 over 6000 men stopped work. All the mines along the Monongahela and in the Youghiogheny district are stopped. The trouble is complicated by a demand from the miners that, if the new explosives are to be used, they shall be paid on a run-of-mine basis, and not on the screened coal, as at present.

Rhode Island

Rhode Island Coal Company—This company has acquired the old coal mine at Cranston in the town of Portsmouth, and announces its intention of working on a large scale. The mine has been worked at varying intervals for many years past, the uniform result being failure, owing to the quality of the product. The promoters of the new concern claim that the difficulty, heretofore insurmountable, of making the coal burn will be overcome through treating it at a cost of a few cents per ton with crude Chile saltpeter, or crude calcium chloride by a patented process developed by Newell W. Bloss, of Brookline, and now controlled by the Coal Treating Company, of Arizona, a company with $5,000,000 capital stock, and C. O. Draper as president. The officers of the Rhode Island company are: Henry M. Whitney, president; J. W. Dennis, vice-president; W. M. Cameron, treasurer; Richard Hay, secretary; Nathaniel B. Wales, J. P. Gardner, Eugene N. Foss, directors. The capital stock of the Rhode Island company is $5,000,000 in $10 shares.

Tennessee

HAMILTON COUNTY

New Soddy Coal Company—The mines at Rathburn, which have been partially closed for several months, have been started up on full time, and the coke ovens have been lighted. It is understood that the company will supply coke to Citico furnace at Chattanooga, which is soon to go into blast.

Utah

BEAVER COUNTY

Moscow—During last month, the mine shipped six cars of fine silver-lead ore. Practically all this ore came from the 500-ft. level where drifting is being done from the shaft and the Red Warrior workings. A large area of virgin ground lies between these points. The company is installing a new boiler which will permit increased development.

Nip and Tuck—A company is being organized to acquire the holdings of this company. The tunnel has just broken into a body of rich ore. The group consists of eight claims and has had little development below the surface.

Bradshaw—Samuel Scott and associates of Columbus, Ohio, have acquired control of this group of eight claims near the Cave mine and will develop the property at depth.

JUAB COUNTY

Tintic Standard—The new shaft is 20 ft. below the 400-ft level and everything is now in condition to make rapid progress in sinking to the 600-ft. level.

East Tintic Development— A new strike of considerable importance has been made in the east drift on the 230-ft. level. The product is almost identical with that encountered in the first strike, running about 60 per cent. lead with some silver.

SUMMIT COUNTY

Little Bell—The company has begun active work of blocking out the orebody opened from the 700-ft. level to a depth of 240 ft. in the inclined winze. The ore

is of shipping grade and the company plans an output of 600 to 700 tons monthly. A test run of the dump ore was recently made at the Daly-West mill and indicated this ore to be worth about $6 per ton to the company. The old dump contains from 20,000 to 25,000 tons. Solon Spiro, manager, McCormick Building, Salt Lake.

Virginia

LEE COUNTY

Black Mountain Coal Company—This new company has bought the Dulaney tract in the Little Mountain coalfield, and is arranging to develop the property, enlarge the mine and build a number of coke ovens.

Keokee Consolidated—This company has acquired the mines and lands of the Keokee Coal and the Imboden Coal companies. It is arranging to increase the output and build coke ovens at Imboden.

Washington

KITTITAS COUNTY

Ellensburg—Twenty-eight claims, extending for six miles along the Yakima river, have been located by W. T. Lewis, who expects to commence sluicing as soon as the necessary equipment can be installed.

West Virginia

New River Company—This holding company has executed a mortgage for $4,000,000 to the Federal Trust Company, of Boston, covering all the property of the New River Company in Raleigh, Fayette, Summers and Mercer counties, West Virginia, and its holdings in 20 subsidiary companies, together with other interests. The mineral lands of the company embrace about 11,500 acres, and it is understood that a large portion of the funds secured from the mortgage will be used to increase the output of the mines already in operation and to open new ones. The headquarters of the company are at Macdonald, W. Va.; Samuel Dixon, of Boston, is president.

MARION COUNTY

Fairmont & Lincoln Coal Company—This company has begun work on a mining plant at Kingmont, which will have a capacity of 1000 tons per day, when completed. O. R. Brownfield, Fairchance, Penn., is president; George S. Price, Fairmont, W. Va., general manager.

Wisconsin

ZINC-LEAD DISTRICT

Chicago Zinc Company—This company has been formed to prospect the Miller land, adjoining the Board of Trade mine on the west.

Platteville—The Lyght mine and mill equipment was bid in by James Jeffrey for mortgagees, at $5200; the property is now under consideration by New York and Buffalo men, represented in the field by B. W. Logan; the Weigle, at Platteville, the Red Jacket, at Centerville, and the Pittsburg, at Cuba City, are also held under option.

Trego—Mining and milling has been begun by the Big Four Mining Company, which recently assumed control of the property.

Jarrett Lead and Zinc—This company, of Cuba City, has started its new mill at St. Rose Crossing.

Dickson-Oettiker—The company is in the market for a 50-ton mill; the lease adjoins the St. Rose mine on the east.

Grant County—The company has developed rich lead and jack since resuming operations early in August.

Hodge—The mine is being unwatered, under option to buy, by Uling & Blumenfeld, of Watertown, and Fred Howe, of Janesville, Wis., who recently purchased the mill equipment for removal to the Forcite mine.

IRON—GOGEBIC RANGE

Davis—The new shaft is now down 1250 ft., and work is being pushed. The shaft is 12x19⅔ ft. in section, being one of the largest on the range.

Montreal Mining Company—The Ottawa mine is being operated steadily. An adjoining 40 acres has been added to the property.

Canada

ALBERTA—LETHBRIDGE

Alberta Railway and Irrigation Company—Completion of new tipple and commencement of production at No. 6 shaft will add 300 to 400 tons to this company's daily output.

ALBERTA—BLAIRMORE

McGillivray Creek Coal and Coke—The No. 2 seam, averaging 12 ft. of clean coal, is being opened by a slope, now in about 200 ft. Equipment of the mine with a power plant, steel tipple, and other surface improvements has been begun. J. F. Povah, Coleman, is general manager.

BRITISH COLUMBIA—AINSWORTH

United—J. S. Airheart, who is operating the Highland-Buckeye properties, has bonded the United, one of the oldest mines in this camp. A tramway is to be constructed from the mine to the Highland mill, on Kootenay lake.

BRITISH COLUMBIA—ATLIN

Ruby Creek Syndicate—Seattle men are arranging to construct a concrete dam to cost about $75,000 to conserve the water for hydraulicking at this property.

BRITISH COLUMBIA—NELSON

Fern Gold Mines, Ltd.—Henry Skoning and J. C. Moen have taken a lease on the Fern gold mine, 11 miles south of Nelson. There is on the property a 10-stamp mill connected with the mine by an aërial ropeway about 2300 ft. long.

BRITISH COLUMBIA—PHOENIX

Shipments from the boundary for the week ending Aug. 21 amounted to 30,862 tons; the Snowshoe shipped 4430 tons to the Trail smeltery; Granby mines, 19,592 tons to Granby smeltery; Mother Lode, 6840 to Greenwood; British Columbia Copper smeltery, total, 8768.

BRITISH COLUMBIA—ROSSLAND

Le Roi—Work has been resumed at the Le Roi, preparatory to deepening the main five-compartment shaft, now down 1650 ft.; extensive prospecting will be done with diamond drills to about 1000 ft. below present lowest workings.

BRITISH COLUMBIA—SIMILKAMEEN

Tracklayers on the V. V. & E. branch the Great Northern railway is building from Oroville, Wash., to Princeton, B. C., have reached Hedley, where is situated the Daly Reduction Company's 40-stamp mill and cyanide plant, for treating ore from the Nickel Plate mine.

Vermilion Forks Mining and Development—Manager Ernest Waterman is obtaining a plant for this company's coal property, near Princeton. Shipments will commence soon after the Great Northern branch reaches Princeton.

ONTARIO—COBALT

Ore Shipments—During the week ended Aug. 21, there were shipped a total of 16 cars, aggregating 488 tons. The shipments were as follows: La Rose, 206,600 lb.; Nipissing, 190,120; Kerr Lake, 123,880; Crown Reserve, 187,840; Temiskaming, 60,000; Right of Way, 61,990; O'Brien, 64,020; Buffalo, 42,350; Cobalt Central, 39,310; total, 976,110 pounds.

Townsite—The shaft at this property, near the Buffalo, is being pumped out and operations will be resumed with English capital. J. Redington, consulting engineer.

Trethewey—Work has been started on the concrete foundations for the new mill.

ONTARIO—MILLER LAKE

Northern Mining—On the Morrison claim a vein 14 to 24 in. wide, carrying calcite and native silver has been exposed and three nuggets, two of them weighing 8 lb. each, and the other 6 lb., have been taken out. The same vein has been exposed 75 ft. further west. Col. E. W. B. Morrison, Ottawa, is president.

NOVA SCOTIA—GLACE BAY

Dominion Coal—Conditions are becoming more normal each day. Shipments for the week ending Aug. 21 were the largest since the strike began, totaling 60,011 tons.

YUKON TERRITORY

Dawson, Y. T.—Rich pay dirt has been found on No. 12 Canyon creek, a tributary to Quartz creek. The dirt is in line with that found along the right limit of Quartz, and is thought to be in the same channel. The Ididerat river is the scene of the latest stampede in the lower Yukon country. Many prospectors are going in. George W. Butler has just returned from the Innoko, and reports great activity in that section. The paying streams in the Innoko are the Ophir, Little, Gaines and Yankee. Four hundred men are in the camp, many of them from Nome. The town which is the heart of the camp is Ophir.

Mexico

CHIHUAHUA

San Toy—The report for the six months, ended June 30, 1909, states that exploratory work has greatly extended the productive area of the old stopes. The tramway terminal, destroyed by fire, has been rebuilt and a three-compartment shaft to be known as La Central, about 1000 ft. north of Juarez No. 1 shaft, has been sunk about 100 ft. A 235-h.p. gas-engine power plant has been shipped from Germany, and is to be ready for use in November. Net earnings of $205,787 are shown for the period.

Manta Mining Company, Ltd—This company, operating the Carmen-Negrita properties, in the Santa Eulalia camp, is reported to have made a good strike of lead-silver ore at a depth of 150 ft. A hoisting plant has been ordered.

New Year Mining Company—This property, of which D. M. Evans of Chihuahua is manager, has begun ore shipments from its Naica mine. The installation of heavier hoisting machinery is contemplated.

Candelaria—Shipments from this company's mines, situated in the San Pedro camp in the northern part of the state, are being made to the El Paso smeltery at the rate of about 150 tons daily.

Belvanera—These mines in the Ocampo camp, formerly controlled by the Colonel Greene interests, are, according to reports, to be shortly operated by the Cole-Ryan interests.

La Fortuna—The silver mine in the Nuevas Casas Grandes camp, in the northern part of the state, is said to be showing up well.

Bullion Shipments—Recent bullion shipments passing through Chihuahua are: Batopilas, 23 bars of silver, value 25,000 pesos; Santa Brigida, one bar gold, value 3000 pesos; Martinez & Larriva, Batopilas, two bars gold-silver, value 1800 pesos.

Zinc Shipments—Shipments and production of zinc ores have fallen off since the Payne tariff bill went into effect. The Chihuahua and the Potosi mining companies, the two largest shippers in the Santa Eulalia camp, discontinued zinc shipments about August 15, but are sending out their regular tonnage of lead-silver ore. On Aug. 18, the Calera Mining Company, operating near San Isidro on the Chihuahua & Pacific railway, suspended both mining and milling operations. It is not anticipated that these conditions will be of long duration. Many of the smaller shippers, such as Jose Lago and Henri Faivre, operating to the east of Chihuahua, are accumulating ores in the hope of an early improvement in United States prices, or for making satisfactory arrangements for marketing their high-grade product in Germany.

Parral Production—The output during July was about 41,700 tons, an increase of nearly 8000 tons over that of the preceding month. The production for the week ending August 13 was 10,500 tons, of which 73,000 tons were of milling grade and treated locally.

JALISCO

Mexican Iron and Steel Company—This company, capital $5,000,000, will take over and operate the Ferreria de Tula property situated on the Colima branch of the National Railways of Mexico, about 75 miles west of Guadalajara. There are said to be over 400 sq.m. of oak and pine forests on the lands. The iron ore is free from injurious impurities, and it is expected that the company will erect a new blast furnace, modern steel plant and by-product kilns for the manufacture of charcoal. It will be necessary to build 40 miles of railroad to exploit the lands, but in the meantime traction engines will be used. Manzanillo, on the Pacific coast, is the most accessible seaport.

NUEVO LEON

Monterey—It has been decided that hereafter native coke will be used exclusively for fuel; this steel company buys about 7000 tons of coke per month. The Sabinas Coal Company, operating at Rosita, Coahuila, has, as a consequence, let a contract for the purchase of $300,000 worth of retort coke ovens in Belgium. The Sampacitos Company recently installed 30 such ovens.

SONORA

Barranca Mines, Ltd.—A 10-stamp mill and cyanide plant has been ordered for this property, near Torres.

Santa Fe—A small force of men is at work cleaning out and putting in shape this property which is about 20 miles south of Cananea. The mine is one of the high-grade antiguas worked for silver and is now being handled by P. S. Tehaney, of Cananea.

Santa Rosalia—Clancy Bros. are financing the company preparatory to sinking a double compartment shaft on the property in the Arizpe district. Rich ore has been encountered in the mine at various times.

Picacho—A development tunnel is being driven to explore the vein at some depth. The property is near Bocoachi and is owned by the Phelps-Dodge interests. There is reported developed and on the dump about 60,000 tons of milling ore.

San Lorenzo—John A. Rice and associates, of El Paso are pushing development work on the property near Cumpas in the Moctezuma district. The ore runs well in copper and silver and carries an excess of iron. Work is being done by tunnels.

Belen—L. H. Van Dusen, manager, reports the company to be still awaiting the completion of the Southern Pacific extension into Cumpas before work on the mine will be resumed.

Africa

WEST AFRICA

Gold production of the Gold Coast and Ashanti in July is reported at 17,331 oz., being substantially the same as in June. For the seven months ended July 31 the total reported was 174,206 oz. bullion in 1908, and 148,672 oz. in 1909; a decrease of 25,534 oz. The bullion reported this year was equal to $2,920,433, or 141,289 oz. fine gold.

Asia

INDIA—MYSORE

Kolar Goldfield—Gold production in July was 46,700 oz., or 225 oz. more than in June. For the seven months ended July 31 the total was 317,668 oz. bullion in 1908, and 320,825 oz. in 1909; an increase of 3157 oz. The bullion reported this year was equal to $5,968,318, or 288,743 oz. fine gold.

New Caledonia

Shipments of ore from the colony for May and the five months, ended May 31, are reported by the *Bulletin du Commerce*, of Noumea as follows, in metric tons:

	May.	Five Months.
Nickel ore	6,490	21,748
Cobalt ore	35	379
Iron ore	.....	10
Chrome ore	1,027	5,844

Nickel ore shipments in May were heavy, but other shipments were light.

New Zealand

Gold production in July was 42,220 oz. in 1908, and 53,710 oz. bullion in 1909; an increase of 11,490 oz. The bullion reported this year was equal to $1,047,195, or 50,663 oz. fine gold. Silver production was 119,492 oz. in 1908, and 120,106 oz. in 1909; an increase of 614 oz. this year.

Metal, Mineral, Coal and Stock Markets

Current Prices, Market Conditions and Commercial Statistics of the Metals, Minerals and Mining Stocks

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

New York, Sept. 1—Coal trade in the West continues to gain in volume, but prices at all the large distributing centers remain very low. The explanation of this is that at every advance in demand mines begin to ship more. No advance can be looked for as long as the capacity for producing coal is so far in excess of consumption as at present.

In the East the bituminous trade is in very much the same condition. Demand is steadily increasing, but prices remain low, and are likely to do so as long as the present competition exists. The trouble in the seaboard trade this year has come mainly from the large shipments of the West Virginia mines. New River and Pocahontas coals have been put on the market almost regardless of price. In fact, New River has been sold as low as $3 per ton, delivered on cars at Boston, and with such prices prevailing, the trade is necessarily demoralized. The New River and Pocahontas shippers are now making an effort to come together, in order to regulate shipments and obtain better prices. There is some prospect of success in this movement.

The anthracite market is generally quiet and steady. Some collieries are still running short time, while others are suffering from short water supply.

Coal Traffic Notes

Coal and coke tonnages originating on Pennsylvania Railroad lines east of Pittsburg and Erie, year from Jan. 1 to Aug. 21, short tons:

	1908.	1909.	Changes.
Anthracite	3,263,180	3,056,443	D. 206,737
Bituminous	20,763,863	22,818,982	I. 2,055,119
Coke	4,330,501	6,568,324	I. 2,237,823
Total	28,357,544	32,443,749	I. 4,086,205

The total increase this year to date was 14.4 per cent.

New York

Anthracite

Sept. 1—The short rush to get coal on the August discount is over; it did not amount to very much. The trade continues quiet and steady with about the usual deliveries.

Today the summer discounts end and coal must now be quoted at full schedule price, which is $4.75 for lump and $5 for egg, stove and chestnut, f.o.b. New York harbor. For steam sizes prices are unchanged; quotations are: Pea, $3.15@3.25; buckwheat, $2.35@2.50; No. 2 buckwheat or rice, $1.70@2; barley, $1.35@1.50; all f.o.b., New York harbor.

Bituminous

The volume of trade continues to increase, though somewhat irregularly. As for some time past, orders come in waves. It is still a consumers' market and buyers are hunting for bargains. The influence of West Virginia coal is felt too strongly to admit of any advance in prices.

The Far East is buying rather freely. The Sound is doing fairly well, but is not quite up to the eastern ports. New York harbor is doing a little better business at the current low prices.

Quotations are unchanged. Good Miller vein steam coal can be had at a delivered price which nets $1.30@1.35 at mines, while lower grades bring 90@95c. per ton at mines, and gas coal can be had at 60@65c. per ton at mine for run-of-mine.

Transportation is about up to schedule, coal coming through on time. There is beginning to be talk of car shortage, but none has actually developed so far.

The coastwise vessel market is in bad shape. There is an oversupply of vessels, so that brokers and captains are showing a readiness to take almost anything they can get. From Philadelphia to Massachusetts and Maine ports rates are 60c. for large vessels, and 75@90c. for small boats which can reach the shoal-water ports. From New York charters can be had at 50c. to points around Cape Cod and 25@35c. to Providence, New Bedford and the Sound.

Birmingham

Aug. 31—Coal production in this State is still improving, and more mines are going into commission, while others are increasing their working forces. More contracts have been placed for fall and winter delivery. It looks as if the output would soon be up to the 1907 level.

Coke demand continues good and more ovens will soon be fired.

Chicago

Aug. 31—The coal trade continues good, in practically every line, with supplies fairly well regulated to the demand and consequently a general maintenance of prices. Steam coals continue to be more and more in demand and the call for domestic grades is beginning to be felt, though yet light. It is the fear of many dealers that the market will again be flooded with shipments of the coals most in demand, and they urge operators to beware of increasing the amount sent to this market. The trouble is that there is no means through which concerted regulation of shipments can be obtained. In Illinois and Indiana coals, the great supply for the Chicago market, something of regulation is accomplished through railroad aid. Lump sizes of these coals are coming into better demand, while the falling off in the demand for screenings shows the passing of the summer. Domestic supplies are being laid in by many retailers, but cool weather alone will make most dealers and consumers buy freely. The anthracite market has seen a slight increase of sales at the August discount, but the demand for anthracite is not large and is not expected to become large until weather conditions encourage it.

Quotations on Illinois and Indiana are, for car-lots: Lump and egg, $1.75@$2.25; run-of-mine, $1.65@$1.75; screenings, $1.25@$1.45. Eastern coals show occasionally low prices due to demurrage, but the situation is much improved. Standard quotations on smokeless are: $3.45 for lump and egg and $2.95 on run-of-mine, for Pocahontas and New River. Hocking is in good condition and fair demand at $3@$3.15 and there is a steady tone to the market for other eastern coals.

Cleveland

Aug. 31—Lake shipments are increasing, and shippers expect a livelier business in September than has been the case so far this season.

Demand locally continues good both for steam and domestic coals. Prices continue about the same. No. 8 district steam brings $1.90@2.05 for lump; $1.70@1.80 for run-of-mine; $1.30@1.35 for slack. Middle district steam is quoted at $1.85@2 for lump; $1.65@1.75 for run-of-mine; $1.15@1.20 for slack. Massillon coal for domestic use is $2.70 for lump. Pittsburg coal is $2.15@2.25 for lump, and $2@2.05 for run-of-mine.

Indianapolis

Aug. 30—The improvement in industrial and general business conditions is reflected in the increasing shipment of coal from Indiana mines. Operators in the Clay and Vigo county fields report large orders received, and many of the mines

that have been working part time will soon be on full time.

In consequence of an appeal from the consul at Chicago, the foreign miners in the Greene-Sullivan county fields will be protected by the local authorities from further attack by the American miners who drove them from their homes and threatened to drive them from the coal-fields of the State. The labor situation at Carlisle, where this trouble arose, is assuming grave aspects. More trouble is expected if the foreigners are put to work again, as the American miners have threatened to lynch them. Governor Marshall has taken the matter in hand.

Pittsburg

Aug. 31—The consumption of coal by manufacturing interests continues to increase slowly but steadily. Lake shipments have probably reached their hight for the season, and do not promise a very heavy total. Prices continue more or less irregular, mine-run frequently selling down to $1, nominal prices remaining at $1.20 to retail dealers and $1.10 to manufacturers. Slack is nominally 65c. but has been sold down to 50@55c. The market is not active.

Connellsville Coke—Prices have advanced rather sharply, as consumption is heavy and the scarcity of labor prevents full operation. The Steel Corporation has picked up a little coke in the market, but has made no large purchases. A sale of 50 cars of standard Connellsville furnace coke for shipment this week was made yesterday at $2. There is little inquiry for contract coke, as consumers generally are covered for this year and are not actively canvassing the market for next year. We quote prices higher on both furnace and foundry coke for prompt shipment as follows: Furnace, $1.90@2; 72-hour foundry, $2.15@2.40, contract coke being nominally at about the same range.

The *Courier* reports the production in the Connellsville and lower Connellsville region in the week ending Aug. 21 at 397,979 tons, a gain of nearly 3000 tons in the week; shipments, 4913 cars to Pittsburg, 7358 cars to points west of Pittsburg and 843 cars to points east of Connellsville, a total of 13,114 cars.

St. Louis

Aug. 28—The coal market as a whole shows an improving tendency. A larger tonnage is now moving than at any time this summer, but prices are unchanged. The mines could still produce twice the demands of the market; consequently it will be some time before any advance in prices can be expected. Lump coal is a little bit firmer than it has been, while screenings and fine coal are easing off.

Demand is being supplied principally by the mines in the Carterville, Franklin county and southern Illinois fields. Prices are low. Carterville 6-in. lump and egg is going around $1.20 per ton at mine, or $1.87 f.o.b. St. Louis; 3-in. nut coal is bringing about $1.10 at mine, or $1.67 St. Louis. Carterville screenings are 50@55c. at mine. Coal from Franklin county at present brings the best price. This is a coal that has sprung into popularity within the last three years. Prices on this have advanced 15 or 20c. per ton in the last three weeks and 6-in. Franklin county lump is quoted at $1.40 per ton at mine, or $2.07 St. Louis; while 6-in. egg is selling at the same and nut 10 or 15c. less.

The Standard or Central Illinois field has been practically lying idle all summer. This field produces a low-grade coal and during the extremely dull period through which we have just passed Standard coal has been supplanted largely by Carterville and other high-grade coal. Standard 6-in. lump is 90c. per ton f.o.b. mine, or $1.47 St. Louis; 2-in. lump has been as low as 75c. per ton at mine, or $1.27 St. Louis. Standard screenings bring about 35c. per ton f.o.b. mine and 87c. St. Louis.

Large quantities of anthracite have been shipped to this market, but not sold until it had incurred demurrage charges. The circular price on hard coal is $6.85 per ton f.o.b. St. Louis, but during the past month very little coal has changed hands at that figure.

Foreign Coal Trade

Russian Coal—Shipments from Donetz basin in Russia for the year 1908 were: Bituminous coal, 10,194,600; anthracite, 2,180,400; coke, 1,415,400; total 13,790,400 metric tons, an increase of 488,600 tons over the previous year.

Spanish Fuel Imports—Imports of coal into Spain, six months ended June 30, were 1,085,764 metric tons, an increase of 130,030 tons over last year. Imports of coke were 143,308 tons, a decrease of 6528 tons. Nearly all these imports were from Great Britain.

Welsh Coal Prices—Messrs. Hull, Blyth & Co., London and Cardiff, report current prices of coal as follows, on Aug. 21: Best Welsh steam, $4.38; seconds, $4.08; thirds, $3.90; dry coals, $4.08; best Monmouthshire, $3.60; seconds, $3.48; best small steam, $2.28; seconds, $1.92. All per long ton, f.o.b. shipping port.

Iron Trade Review

New York, Sept. 1—The iron and steel markets cannot be said to show any special change from last week, although business generally continues active.

The demand for pig iron continues good in the Central West, and prices still have an upward tendency. Although most of the steel companies have put more furnaces in blast, there is still a demand for bessemer from outside sources, and $16.50 is about the lowest price that is offered for such iron. In Eastern territory the demand is chiefly for foundry and basic, good contracts for both having been placed. There also the tendency is upward, and furnaces are again asking 25 or 50c. more on deliveries running over into next year. Southern iron is firm at $14, Birmingham, and makers are talking about $14.50 for first quarter.

In finished material the demand is now pretty well distributed and all kinds of steel are finding a ready market on new orders, while specifications on running contracts are coming in very freely. A few large orders for structural steel are noted, besides a number of small contracts. The demand for nails and other small building material continues good.

An unusual feature is that sales of iron ore are still being made to merchant furnaces, which is very unusual so late in the season. The explanation is that a number of stacks which did not expect to go into blast are finding that demand warrants them in starting up and that they must be looking after supplies.

Baltimore

Aug. 31—Exports for the week included 4,956,200 lb. steel billets to Great Britain; 540,187 lb. structural steel to Port Limon, Costa Rica; 1,144,535 lb. structural steel to Panama; 4452 tons steel rails and 298 tons rail fastenings to Guaymas, Mexico; 337,055 lb. tin scrap to Rotterdam. Imports included 264 casks ferrosilicon from Rotterdam; 14,700 tons iron ore from Cuba.

Birmingham

Aug. 31—Prices remain firm; nothing is being sold right now under $13.50 for No. 2 foundry, and $14 is asked for later deliveries. None of the selling companies is seeking business for next year, being confident that prices will be on a higher basis. Many inquiries are being received, but no large sales have been closed.

The make of iron keeps up well, and this month has seen a larger production than for many months past. Cast-iron pipe makers and other local industries are using more iron. The steel works at Ensley continue active.

Chicago

Aug. 31—Strength continues in the iron market, with sales in general well distributed and a few large contracts closed in Chicago territory. The selling element is very diffident about 1910 contracts; considering the strong tendency upward, it prefers to await developments. Melters, on the contrary, are eager to contract and some of them have closed agreements for large tonnage at good prices. Northern is especially strong in view of recent contracts at $18@18.50 for No. 2, and $18.50 may be considered

the standard price for last-quarter and first-quarter sales. Southern sales agents are less conservative; $14 Birmingham ($18.35 Chicago) holds, with sales of increasing size and well distributed. The market is strengthening from day to day. In every line of finished products the market is strong. Sales of railroad supplies and structural materials continue large. Coke is in better demand, but good supply, and has advanced 15c., the best Connellsville now selling at $4.85, Chicago.

Cleveland

Aug. 31—Buying of ore continues at a rate unprecedented so late in the season. Prices are unchanged at $4.50 for Old Range bessemer, and $4.25 for Mesabi; $3.70 for Old Range and $3.50 for Mesabi nonbessemers; all f.o.b. Lake Erie docks, with guarantee of 55 per cent. iron on bessemers and 51.5 on nonbessemers.

Pig Iron—There is more inquiry for iron, and business is active. Some large sales are reported of iron on analysis for special purposes. Bessemer is quoted $16.25@16.50; No. 2 foundry, $16.50@16.75; gray forge. $15@15.50; Jackson county silvery, $20, Cleveland delivery.

Finished Materials—Mills are full of orders, especially on bars. Makers have some trouble in meeting demands on time, and there is already some talk of premiums on early deliveries, especially of plates and structural steel.

Philadelphia

Sept. 1—The past week has been active in all grades of iron. The most active is basic and after long parleying several big orders have been placed. Makers of basic, it is reported, today are about to quote a higher price. It is threatened with a speculative advance. Foundry has been bought more freely also, and for still later delivery, though no orders call for delivery after the end of the year, as yet. The undertone of the entire pig-iron market is stronger.

Special brands of foundry have been advanced to $18; basic is strong at $17.50; forge is quiet.

Steel Billets—The market is strong under an expanding consumption. Forging billets have been sold at a 50c. advance.

Bars—Refined bars are in active demand in small lots. Stores are adding assorted lots. Common iron is quiet at 1.50c., but a heavy business is in sight.

Sheets—The sheet mills are booking business with renewed activity. Local distribution is more active than for months.

Pipes and Tubes—No new developments have appeared in the market. Consumption is increasing.

Plates—But little new business was placed this week. Carbuilders, shipbuilders and other large consumers have asked quotations for 1910 delivery. Offices report a steady influx of small orders for early delivery.

Structural Material—Apart from the usual run of bridge-building orders, there has been an increase of orders for ordinary construction. Building operations calling for structural steel are about double what they were last year in this territory. An advance of about $2 a ton on orders under 100 tons is practically assured this month.

Scrap—All kinds of scrap are moving but in small quantities. Heavy cast and No. 1 yard scrap are practically cleaned up and dealers are today asking 50c. more for deliveries to be made within 30 days. Yard stocks are not heavy and dealers are holding to firm prices.

Pittsburg

Aug. 31—The progress of the iron and steel trade, with continued increase in production and advancing prices, is bringing the situation to an interesting juncture. New buying of finished steel products has been decreasing slightly during August while specifications on old contracts seem to have increased; at any rate, the mills report that they are falling farther behind in deliveries in many important lines, so that new specifications must take their turn farther and farther ahead. At the same time prices continue to harden, although there have been no striking advances in the past week, so that when present contracts run out buyers will have to face higher prices than ruled when these contracts were made. The advancing tendency in finished steel products, while quite discernible, has been less strong than that in crude materials, with the result that the spread is decreasing, and one class or the other must yield. Plates and shapes, for instance, are selling at 1.40c., or $28 a net ton, while bessemer billets are $24.50 and open-hearth billets $25@26; bessemer pig is $16.75, Valley, or $17.65, Pittsburg, and heavy melting scrap is all of $17, delivered, with very little to be had at that price. The spread between pig iron and scrap on the one hand and finished steel on the other is altogether too small according to the precedents of the trade.

Scrap is very tightly held, holders professing to expect $18 or $19. Pig iron has been steadily advancing, and on rather light sales. There is, however a total of more than 100,000 tons of bessemer held by merchants and merchant furnaces which is likely to begin coming out shortly.

Pig Iron—The Youngstown Sheet and Tube Company has bought 5000 tons of bessemer in addition to purchases mentioned in last report, at $16.50, furnace, securing 1000 tons from a merchant furnace and 4000 tons from a merchant firm which holds considerable iron. Sellers claim the market has practically advanced to $16.75, Valley, for any delivery, but this is not established. A sale of 1000 tons has been made at $17 for first quarter of next year, and a sale (yesterday) of a single carload at $16.90, Valley. We quote the market at $16.75, Valley, for this year, and $17 for next year. The last sales of basic were made at $15.25, Valley, but with the advance in bessemer and in the absence of recent sales of basic the market can fairly be quoted at $15.50@15.75. Foundry iron is $15.50@15.75 for this year and $16 and higher for next year, with forge at $14.50@15 and malleable at about $16, all at Valley furnace, Pittsburg prices being 90c. higher.

Ferromanganese—The market continues strong at $42, Baltimore, or $43.95, Pittsburg, for prompt, extended deliveries commanding $43@44, seaboard.

Steel—Bessemer billets are quotable 50c. higher at a minimum of $24.50, Valley, while open-hearth billets remain at $25@26, Pittsburg, and sheet-bars at $25.50@26, Pittsburg.

Sheets—The market shows further strength, with most of the mills sold up for 60 days or more and refusing to quote for delivery late in the year. Regular prices of 2.20c. for black and 3.25c. for galvanized, with $1.55 for painted corrugated roofing and $2.80 for galvanized, are strictly observed. The American Rolling Mill Company, Middletown, O., has about decided to install 10 additional sheet-mills, at the same time increasing its open-hearth steel making capacity in proportion.

St. Louis

Aug. 30—Pig iron is active, Southern No. 2 foundry brings $13.50 Birmingham, or $16.50 St. Louis. Inquiries are comming in from all quarters and foundries are asking for rush shipments on stuff already ordered.

Metal Markets

New York, Sept. 1—The metal markets have been fairly active during the week, but show no changes of importance.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal.	Exports.	Imports.	Excess.
Gold:			
July 1909..	$16,661,782	$ 3,269,885	Exp. $13,391,897
" 1908..	4,845,272	2,949,179	Exp. 1,896,093
Year 1909..	80,496,119	23,405,477	Exp. 57,090,642
" 1908..	58,363,098	29,357,075	Exp. 29,006,172
Silver:			
July 1909..	5,049,366	3,926,117	Exp. 1,123,249
" 1908..	4,930,746	3,039,581	" 1,891,165
Year 1909..	34,409,032	26,798,145	" 7,610,887
" 1908..	30,445,291	24,180,929	" 6,264,362

Exports from the port of New York, week ended Aug. 28: Gold, $38,890; silver, $839,056, chiefly to London. Imports: Gold, $82,406; silver, $67,759; both from the West Indies, Mexico and South America.

Gold—There has been no special demand and prices on the open market in London remain 77s. 9d. per oz. for bars and 76s. 4d. per oz. for American coin. In New York no exports are reported during the week.

Platinum—Dealers are quoting $24@24.50 per oz. for refined platinum; $28.25 for hard metal, and $19@21 for good scrap. The tendency of prices seems to be upward, and if the consumption improves this fall, manufacturers look for still higher quotations.

Our St. Petersburg correspondent writes under date of Aug. 20 that a considerable advance is to be noted. In Ekaterinburg quotations are 5 rubles per zolotnik for crude platinum, 83 per cent.—equivalent to $18.80 per oz. In St. Petersburg the price advanced during the week from 19,200 rubles per pood to 20,500 rubles, 5 poods being sold. The prices named are equivalent to $18.82 and $20.09 per oz., respectively. The advance is explained by the expected agreement between the two largest producers in Russia, the Société Anonyme de l'Industrie du Platine and the Estate of Prince Demidoff.

Silver—Silver has shown some tendency to improvement in price. This advance is not owing to any scarcity of bullion, but is due to the fact that the crop outlook of the East is considered up to date very favorable. If this condition is maintained with moderate imports, silver will likely advance still higher.

SILVER AND STERLING EXCHANGE

Aug.-Sept.	26	27	28	30	31	1
New York....	51⅝	51⅝	51½	51⅜	52	51¾
London.....	23⅛	23⅛	23¾	23⅞	24	23⅞
Sterling Ex..	4.8700	4.8690	4.8685	4.8680	4.8660	4.8655

New York quotations, cents per ounce troy, fine silver; London, pence per ounce sterling silver, 0.925 fine.

Exports of silver from London to the East, Jan. 1 to Aug. 19, as reported by Messrs. Pixley & Abell:

	1908.	1909.	Changes.
India.....	£ 6,143,163	£4,240,000	D. £1,903,163
China.....	616,400	1,555,200	I. 1,038,800
Straits.....	90,510	82,800	D. 7,710
Total.....	£ 6,750,073	£5,878,000	D. £ 872,073

Copper, Tin, Lead and Zinc

Aug.-Sept.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. New York, Cts. per lb.	Lead. St. Louis, Cts. per lb.	Zinc. St. Louis, Cts. per lb.
	13¼	12⅞		30¾	4.37½	4.25	5.60
26	@13⅜	@13⅜	59⅝	@30⅞	@4.42½	@4.27½	@5.65
	13⅜	12⅞		30¼	4.37½	4 25	5.60
27	@13⅜	@13⅜	59¾	@30⅜	@4.42½	@4.27½	@5.65
	13⅜	12⅞		30⅜	4.37½	4.25	5.60
28	@13⅜	@13⅜	....	@30⅝	@4.42½	@4.27½	@5.65
	13⅜	12⅞		30⅜	4 37½	4.22½	5 60
30	@13⅜	@ 3⅜	59¾	@31	@4.40	@4.25	@5.62½
	13⅜	12⅞		30⅝	4.37½	4.22½	5.60
31	@13⅜	@13⅜	59½	@30⅞	@4.40	@4 25	@5.62½
	13⅜	12⅞		30⅜	4.37½	4.22½	5.60
1	@13⅜	@13⅜	59⅜	@30⅜	@4.40	@4.25	@5.62½

London quotations are per long ton (2240 lb.) standard copper. The New York quotations for electrolytic copper are for cakes, of the transactions made with consumers, ingots and wirebars, and represent the bulk basis, New York, cash. The price of cathodes is usually 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

Copper—The market has been an uninteresting affair throughout the week of Aug. 26-Sept. 1. The demand from consumers was light and to all appearances there is more copper for sale at current quotations than can be placed. About all of the agencies are now offering electrolytic up to the end of the year at 13¼c., delivered, 30 days, equivalent to a little less than 13⅛c., cash, New York, and concessions are made to consummate desirable business, particularly for prompt and nearby deliveries. There is more or less difference in the attitude of the various agencies, some being rather reserved and stiffish, at least ostensibly, at their asking price, while certain are more aggressive in their offerings and efforts to secure business. The latter attitude puts a damper upon any ideas for a bull movement. Transactions in Lake during the last week were comparatively small. Some small lots of special brands sold at 13⅜@13¾c., and the latter figure is still the nominal asking price of the Calumet & Hecla. Prime Lake copper is offered by other first-hands at 13⅜c., delivered, 30 days, equivalent to about 13.3c., cash, New York, and as low as 13¼c. Some considerable transactions by second-hands were reported as made at 13⅛c. Right at the close some good-sized sales of Lake were made at 13½c. The market closes at 13¼@13½c. for Lake, and 12⅞@13⅛c. for electrolytic in cakes, ingots and wirebars. The average for casting has been 12¾@12⅞ cents.

Copper sheets are 17@18c., base for large lots. Full extras are charged, and higher prices for small quantities. Copper wire is 15c. base, carload lots at mill. Business continues on a good scale.

The standard market held fairly steady until the publication of the statistics on Sept. 1, when it became known that there was an increase of 7400 tons. A selling movement ensued, which depressed the quotations at the close to £59 2s. 6d. for spot and £60 1s. 3d. for three months. For refined and manufactured sorts we quote: English tough, £63; best selected, £62@63; strong sheets, £74@75.

The copper market was relatively dull up to Aug. 10, when the publication of the American statistics showing a decrease of about 32,000,000 lb. in visible supply induced excited buying from European sources and a considerable business from domestic manufacturers, prices advancing to 13½c. for lake and 13@13¼c. for electrolytic. Later on the conviction became general that the statistics for the end of July were not really so good as they looked, and consumers having supplied themselves liberally became disposed to await developments before entering into new commitments. The natural result was that the selling agencies, which still had an abundant supply to sell, became once more pressing in their competition and willing to make concessions in order to obtain business. August closed with Lake copper at 13¼@13½c., and electrolytic at 12⅞@13⅜ cents.

Exports of copper from New York and Philadelphia for the week were 2814 long tons. Our special correspondent gives the exports from Baltimore at 1648 tons.

Tin—The upward movement in the London market continued until Monday of this week. Subsequently a reaction set in which carried prices down over £2, the close being cabled as weak at £137 7s. 6d. for spot and £138 7s. 6d. for three months. Statistics for the month of August show a decrease of 600 tons.

The market here followed closely the fluctuations in London, as far as near-by deliveries are concerned, but there have been some evidences of profit-taking on futures, which carried prices below the importation point. Business currently is taking place at 30⅛@30¼ cents.

Lead—There has been little buying on the part of consumers and offerings, particularly from Missouri, are more liberal. As a result, the market has an easier tone and closes at 4.22½@4.25c. St. Louis and 4.37½@4.40c. New York.

The London market is somewhat higher at £12 11s. 3d. for Spanish and £12 13s. 9d. for English lead.

Spelter—In the absence of buying on the part of consumers the market is inclined to droop and sales, particularly of speculative lots, are reported to have taken place at considerably below current quotations, which are 5.60@5.62½ St. Louis and 5.75@5.77½c. New York.

New York quotations for spelter Aug. 26-28, inclusive, were 5.75@5.80c.; Aug. 30-Sept. 1, inclusive, 5.75@5.77½ cents.

Base price of sheet zinc is now 7½c. per lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

London closes at £22 10s. for good ordinaries and £22 15s. for specials.

Other Metals

Antimony—Quotations are 8⅝c. for Cookson's; 8c. for U. S.; 7½@7¾c. for outside brands. Business is better than it has been and inquiries are coming in well.

Aluminum—There is no change in the market. No. 1 ingots can be had at 20@23c. per lb. for large lots. The higher price is that asked by the American maker.

Quicksilver—Business is fair, but prices are unchanged at $43.50@44 per flask of 75 lb., New York. San Francisco is $42@43 for domestic orders, and $40@

41 for export. London is £8 5s. per flask, but as low as £8 is quoted by jobbers.

Nickel—Large lots, contract business, 40@45c. per lb. Retail, spot, from 50c. for 2000-lb. lots, up to 55c. for 500-lb. lots. The price for electrolytic is 5c. higher.

Magnesium—Quotations for this metal are $1.25 per lb., New York, in 100-lb. lots; for 5-lb. lots, $1.40 per pound.

Cadmium—Current quotations are 75c. per lb. in 100-lb. lots at Cleveland, Ohio. In Germany 450@475 marks per 100 kg., at factory in Silesia.

Spanish Metal Exports

Exports of metals and minerals from Spain, five months ended May 31; reported by *Revista Minera*, in metric tons:

Metals.	1908.	1909.	Changes.
Pig and manuf. iron	13,428	25,466	I. 12,038
Copper	5,192	8,168	I. 2,976
Copper precipitate	8,789	6,146	D. 2,643
Lead	75,230	71,139	D. 4,091
Zinc	411	830	I. 419
Quicksilver	1,262	1,250	D. 12
Minerals.			
Iron ore	3,249,858	3,125,306	D. 124,552
Manganese ore	9,997	4,587	D. 5,410
Copper ore	516,127	488,972	D. 27,155
Lead ore	1,596	1,342	D. 254
Zinc ore	38,792	53,733	I. 14,941
Pyrites	645,634	551,424	D. 94,210
Salt	301,582	290,180	D. 11,402

Imports of phosphate rock, 34,774 tons in 1908, and 38,955 in 1909; increase, 4181 tons.

German Metal Imports and Exports

Import and exports of metals—other than iron—in Germany, half-year ended June 30, in metric tons:

	Imports.	Exports.	Excess.
Copper	86,462	31,190	Imp. 55,272
Copper, 1908	90,979	35,570	Imp. 55,409
Tin	6,492	3,452	Imp. 3,040
Tin, 1908	7,685	2,930	Imp. 4,755
Lead	33,741	18,608	Imp. 15,133
Lead, 1908	35,962	21,228	Imp. 14,734
Zinc	19,079	45,690	Exp. 26,611
Zinc, 1908	15,482	42,177	Exp. 26,695
Nickel	1,415	965	Imp. 450
Nickel, 1908	1,572	979	Imp. 593
Aluminum	3,214	794	Imp. 2,420
Aluminum, '08	1,248	545	Imp. 703
Miscellaneous	979	4,651	Exp. 3,672
Miscellan's, '08	965	4,738	Exp. 3,773

The figures include alloys and manufactures of the several metals. Imports and exports of ores—other than iron—for the half-year, were, in metric tons:

	Imports.	Exports.	Excess.
Gold ore	26	.....	Imp. 26
Gold ore, 1908	22	.....	Imp. 22
Silver ore	560	.....	Imp. 560
Silver ore, '08	920	.....	Imp. 920
Copper ore	10,250	10,033	Imp. 217
Copp'r ore, '08	7,032	15,016	Exp. 7,982
Tin ore	6,936	12	Imp. 6,924
Tin ore, 1908	4,902	25	Imp. 4,877
Lead ore	52,324	955	Imp. 51,369
Lead ore, '08	66,804	505	Imp. 66,299
Zinc ore	93,094	17,648	Imp. 75,446
Zinc ore, 1908	91,574	13,145	Imp. 78,429
Nickel ore	6,576	.....	Imp. 6,576
Nickel ore, '08	6,082	.....	Imp. 6,082
Miscellaneous	2,057	129	Imp. 1,928
Mis., 1908	2,482	165	Imp. 2,317

Imports of chrome ore were 9651 tons in 1908, and 9674 in 1909. Imports of pyrites were 298,778 tons in 1908, and 303,432 in 1909; exports, 6357 and 5739 tons for the respective years. Miscellaneous ores include uranium, molybdenum, tungsten and other minor metals, with some mixed or complex ores.

Zinc and Lead Ore Markets

Joplin, Mo., Aug. 28—The highest price paid for zinc sulphide ore was $52.50, the assay base price ranging from $48 to $50 per ton of 60 per cent. zinc. Zinc silicate ore sold as high as $35.50, the assay base ranging from $23.50 to $27.50 per ton of 40 per cent. zinc. The average price, all grades, was $46.70 per ton. Lead ore sold as high as $60 without regard to any base price. Some ore averaging under 80 per cent. lead and some as high as 81 per cent. lead sold at the same figure. The average price, all grades, was $59.70 per ton.

The excitement of last week and the week before has given way to more rational buying, and zinc-ore prices are settling back toward the value of the metal contents compared with the market value of the metal. A further decline is anticipated until an equilibrium has been reached.

SHIPMENTS, WEEK ENDED AUG. 28.

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	3,490,010	1,225,110	$124,003
Joplin	1,923,540	541,020	63,642
Duenweg	630,400	313,120	24,679
Granby	1,048,140	13,500	17,345
Badger	564,670	44,820	15,323
Galena	503,060	63,250	14,189
Aurora	432,070	167,560	12,558
Miami	421,070	63,720	11,111
Oronogo	387,420	2,970	9,255
Prosperity	303,350	34,330	8,612
Jackson	234,710	82,740	8,034
Spurgeon	246,720	73,970	7,319
Alba-Neck	253,220	6,220	6,516
Quapaw	255,070	7,690	6,345
Carl Junction	93,030	.....	3,317
Shoalsburg	108,140	.....	2,465
Cave Springs	62,590	.....	1,730
Carthage	61,940	.....	1,565
Sarcoxie	62,750	.....	1,548
Wentworth	74,740	.....	1,291
Totals	11,289,330	2,640,020	$342,165
35 weeks	395,685,890	60,662,150	$9,239,393
Zinc value, the week, $263,602; 35 weeks, $7,590,899			
Lead value, the week, 78,563; 35 weeks, 1,648,494			

MONTHLY AVERAGE PRICES

Month.	Zinc Ore. Base Price.		Zinc Ore. All Ores.		Lead Ore. All Ores.	
	1908.	1909.	1908.	1909.	1908.	1909.
January	$37.60	$41.25	$35.56	$38.46	$46.88	$52.17
February	36.63	36.94	34.92	34.37	49.72	50.50
March	36.19	37.40	34.19	34.71	49.90	50.82
April	35.40	38.63	34.08	37.01	52.47	55.63
May	34.19	40.06	33.39	37.42	56.05	56.59
June	33.06	44.15	32.07	40.35	60.48	57.52
July	34.55	43.06	31.67	41.11	59.90	53.74
August	36.53	48.25	33.42	44.54	60.34	57.60
September	37.63	.....	34.44	.....	54.59	.....
October	35.95	.....	33.28	.....	52.63	.....
November	39.13	.....	35.02	.....	54.53	.....
December	42.75	.....	39.63	.....	49.68	.....
Year	$36.63	.....	$34.31	.....	$53.93	.....

NOTE—Under zince ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

Platteville, Wis., Aug. 28—The highest price paid this week for zinc ore was $52; the base price of 60 per cent. zinc was $50 per ton. The top price paid for lead ore was $60; the base price, 80 per cent., was $58 per ton.

Competition was keen for ore, especially lower grades of zinc, and bids were made beyond the usual ratio. A number of smaller companies helped to keep up the shipment; several big producers which have been temporarily closed are running again, which will increase the weekly shipment to 4,000,000 lb. of zinc ore.

SHIPMENTS, WEEK ENDED AUG. 28.

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Cuba City	492,480	138,830	.....
Highland	458,550	81,800	.....
Platteville	397,245	.....	184,200
Days Siding	330,000	.....	.....
Hazel Green	325,900	.....	.....
Benton	312,580	73,000	.....
Harker	220,120	.....	.....
Livingston	160,000	.....	.....
Galena	160,000	.....	.....
Shullsburg	160,000	.....	.....
Strawbridge	88,000	.....	.....
Rewey	65,000	.....	.....
Mineral Point	64,500	.....	.....
Linden	62,740	.....	.....
Dodgeville	60,000	.....	.....
Total	3,357,115	293,630	184,200
Year to Aug. 28	87,944,674	5,259,450	7,891,940

In addition to the above there was shipped to the American Zinc Ore Separating Company, 437,860 lb., and to the Joplin Separator Works, 259,200 lb. zinc concentrates.

Chemicals

New York, Sept. 1—The market continues steady and spot business is improving. Deliveries on contracts are good.

Copper Sulphate—Prices are unchanged at $4.22½ per 100 lb. for carloads or over, and $4.32½@4.47½ per 100 lb. for smaller orders. Business is rather quiet.

Arsenic—Sales have been fair and prices are a little firmer at 2¾c. per lb. for white arsenic.

Nitrate of Soda—Business is quiet. Prices continue 2.12½c. per lb. for spot and 2.10c. for all positions next year.

The Nitrate Development Association, of Iquique, Chile, reports that the production of nitrate of soda in Chile for the seven months ended July 31 was 1,500,000 quintals less than in the corresponding period of 1908. On the other hand there has been an increase of 2,500,000 quintals in shipments and estimated consumption.

Mining Stocks

New York, Sept. 1—The general stock markets have shown some degree of recovery this week, though in rather irregular fashion. Prices have advanced generally, but in some cases have receded also. The movement is still chiefly inside, and the public is not much in evidence. Upon the whole, however, there has been rather a stronger tendency.

On the Curb there was liquidation in some of the copper stocks, with some evidences of an attempted bear raid. The movement was not general, and some stocks showed higher quotations. The

Curb as a whole was rather irregular. The Nevada gold stocks were rather slow, and there were few changes. The Cobalt stocks were quiet, but not weak, holding their prices fairly well. Industrials suffered a little, and Southern Iron and Steel especially was lower.

Boston, Aug. 31—Mining stocks had sharp setbacks last week in sympathy with the declining market in New York. Lake Copper broke over $5 to $29.75, but sharp recovery followed which put the price to $37.50 today. The advance to $38 some ten days ago was rapid, and the pace did not meet with the approval of inside interests. North Lake in the meantime broke to below $9.

U. S. Smelting has risen steadily in the face of an otherwise weak market, and records a $3.75 advance for the week to $57.50. North Butte did not react much, and seems to be in demand, which holds the price firm around $61. Centennial has been quietly picked up at $38.75. The floating supply of the stock is not very large. The so-called Amster stocks show a hardening tendency due to the expected arrival of Mr. Amster this week. These include the Arizona Commercial, Boston & Corbin and Shannon Copper. Copper Range directors have declared the usual $1 quarterly dividend.

Curb business has been quiet, and for a spell prices were weak, but now show a hardening tendency. National Mining and Exploration has risen from 45 to 68c. on heavy trading the last day or two.

STOCK QUOTATIONS

NEW YORK	Sept. 1	BOSTON	Sept. 1
Name of Comp.	Clg.	Name of Comp.	Clg.
Alaska Mine	‡.11	Adventure	7
Amalgamated	83⅛	Allouez	48
Anaconda	48⅛	Am. Zinc	31¼
Balaklala	2⅞	Arcadian	‡3⅞
British Col. Cop.	6⅝	Arizona Com.	43¾
Buffalo Mines	3⅛	Atlantic	10¼
Butte Coalition	25⅛	Boston Con.	15
Colonial Silver	‡⅞	Calumet & Ariz.	105½
Cum. Ely Mining	7⅛	Calumet & Hecla	680
Davis-Daly	6¾	Centennial	38¾
Dominion Cop.	7	Copper Range	82⅛
Douglas Copper	1¾	Daly-West	8
El Rayo	2¾	East Butte	12
Florence	3⅛	Franklin	16½
Foster Cobalt	‡.32	Greene–Can.	9½
Furnace Creek	‡.05	Hancock	‡9½
Giroux	10	Isle Royal	28
Gold Hill	‡⅛	Keweenaw	‡3⅞
Goldfield Con.	6⅞	La Salle	‡14¾
Granby	‡101	Mass.	8⅛
Greene Gold	‡⅛	Michigan	8½
Greene G. & S.	‡9	Mohawk	63½
Guanajuato	1¾	Nevada	24¼
Guggen. Exp.	216⅝	North Butte	61¼
Hanapah	‡15	Ojibway	10¾
Kerr Lake	8⅛	Old Colony	‡60
McKinley-Dar.	.89	Old Dominion	.57
Miami Copper	16½	Osceola	146
Micmac	⅛	Parrot	33¼
Mines Co. of Am.	⅛	Quincy	90
Montezu. of C. R.	25	Rhode Island	‡4¾
Mont. Sho. C.	2⅜	Shannon	16⅛
Nev. Utah M. & S.	1½	Superior	59
Newhouse M. & S.	3⅞	Superior & Bost.	15⅞
Nipissing Mines	10⅝	Superior & Pitts.	16
Old Hundred	½	Tamarack	‡65
Silver Queen	.40	Trinity	13
Stewart	⅛	U. S. Smg. & Ref.	57⅞
Tennessee Cop'r.	‡39	U.S.Sm. & Re., pd.	52¼
Tri-Bullion	⅛	Utah Con.	45¾
United Copper	10⅞	Victoria	4
Utah Apex	4⅛	Winona	6
Utah Copper	51⅛	Wolverine	158
Yukon Gold	5⅛	Wyandotte	2⅛

‡Last quotation. ‡Last quotation.

N. Y. INDUSTRIAL	
Am. Agri. Chem.	49
Am. Smelt. & Ref.	99⅝
Am.Sm. & Ref., pf.	114¾
Colo. Fuel & Iron.	45
Federal M. & S., pf.	‡91⅛
National Lead	91⅞
National Lead, pf.	112
Pittsburg Coal	22¾
Republic I. & S.	38
Republic I. & S., pf.	105
Sloss-Sheffield	85
Standard Oil	‡685
U. S. Steel	77¼
U. S. Steel, pf.	125⅛
Va. Car. Chem.	48½

BOSTON CURB	Low.
Ahmeek	195
Chemung	15
Chino	7⅝
Globe Con	4½
Gila	9¾
Mason Valley	2
Ray Central	2⅛
Ray Con.	19
San Antonio	8⅛
Yuma	2

Furnished by Hornblower & Weeks, N. Y.

ST. LOUIS	Aug. 28		
N. of Com.	High.	Low.	
Adams	.40	.30	
Am. Nettie.	.10	.07	
Center Cr'k	2.00	1.75	
Cent. C. & C.	84.00	82.00	
C.C. & C. pf.	82.00	81.00	
Cent. Oil	115.00	100.00	
Columbia	9.00	7.00	
Con. Coal	20.00	19 00	
Doe Run	115.00	110.00	
Gra. Bimet.	.25	.22	
St. Joe	12.50	11.00	

LONDON	Sept. 1		
Name of Com.	Clg.		
Dolores	£1	5s	0d
Stratton's Ind.	0	3	3
Camp Bird	1	7	9
Esperanza	2	18	9
Tomboy	1	1	3
El Oro	1	6	0
Oroville	0	12	6

Cabled through Wm. P. Bonbright & Co., N. Y.

NEVADA STOCKS. Sept. 1.

Furnished by Weir Bros. & Co., New York.

Name of Comp.	Clg.
COMSTOCK STOCKS	
Belcher	1.25
Best & Belcher	.62
Caledonia	.31
Challar	.28
Comstock	.28
Con. Cal. & Va.	1.47
Crown Point	.95
Exchequer	.41
Gould & Curry	.32
Hale & Norcross	.42
Mexican	1.10
Ophir	1.27
Overman	.40
Potosi	52
Savage	.49
Sierra Nevada	.49
Union	.54
Utah	.09
Yellow Jacket	1 15
TONOPAH STOCKS	
Belmont	.84
Extension	.60
Golden Anchor	...
Jim Butler	.16
MacNamara	.32
Midway	.20
Montana	.98
North Star	02
Tono'h Mine of N.	6.87½
West End Con.	30
GOLDFI'D STOCKS	
Adams	01
Atlanta	.15
Blue Bell	.04
Booth	.14
C.O.D. Con.	.10
Columbia Mt.	.11
Comb. Frac.	.70
Con. Red Top	...
Cracker Jack	.02
Dia'dfield B. B. C.	.02
Goldfield Belmont	.04
Goldfield Daisy	19
Great Bend	07
Jumbo Extension	18
Kendall	02
Lone Star	03
May Queen	04
Oro	07
Red Hill	08
Sandstorm	06

Name of Comp.	Clg.
Silver Pick	.15
St. Ives	.06
Triangle	.01
BULLFROG STOCKS	
Gibraltar	.02
Homestake King.	...
Mont. Shoshone C.	2 00
Tramp Cons.	.04
MISCELLANEOUS	
Cumberland Ely.	7.12½
Giroux	9.50
Greenwa'r Copper	.04½
Nevada Con.	24.00
Nevada Hills	.70
Navada Smelting.	1 00
Nevada Wonder.	.60
Nevada-Utah	1.87½
Penn-Wyoming	...
Pittsburgh S. Pk.	.48
Ray Central	2.68¾
Ray Con.	18.75
Round Mt. Sphinx	05

COLO. SPRINGS	Aug. 27
Name of Comp.	Clg.
Acacia	.08¾
C. C. Con.	03¾
Dante	.07
Doctor	.10½
Elkton	.75¾
El Paso	.66¾
Findlay	.11
Gold Dollar	.13
Gold Sovereign	.04¾
Isabella	.23¾
Jack Pot	‡.08½
Jennie Sample	‡.07½
Jerry Johnson	.06¾
Lexington	‡.02
Mary McKinney	‡.49
Pharmacist	.03¾
Portland	‡.82
U. G. M.	07
Vindicator	.70
Work	.08½

Assessments

Company.	Delinq.	Sale.	Amt.
Alta Gladstone, Utah	Sept. 15	Oct. 20	$0.00½
Arcadian, Mich.	Sept. 1	Sept. 31	0.50
Boulder Cr'k M. & M., Wash.	Aug. 31	Sept. 30	0.01
Con. Virginia, Nev.	Aug. 16	Sept. 7	0.25
Copper Mt. M. & D., Ida	Sept. 7	Oct. 4	0 003
Crown Point, Nev.	Aug. 21	Sept. 17	0.10
East Buffalo, Ida.	Sept. 10	Oct. 10	0.000½
Exchequer, Nev.	Aug. 16	Sept. 13	0.05
Golden Winnie Tungsten, I.	Aug. 23	Sept. 15	0.001
Hancock Con., Mich.	Oct. 10	.....	1.00
Hypotheek, M. & M., Ida.	Aug. 26	Sept. 25	0 005
Laclede, Ltd, Ida.	Aug. 23	Sept. 21	0.003
Lady Washington, Nev.	Aug. 31	Sept. 20	0.05
Massasoit, Utah	Aug. 21	Sept. 14	0.00½
New Hope, Ida.	July 15	Sept. 25	0.002
Pittsburg Con., Utah	Aug. 20	Sept. 17	0.01
Seven Troughs Mon., Nev.	Aug. 18	Sept. 8	0.00½
Springfield M. Co. Ltd, Ida.	Aug. 13	Sept. 13	0.002
West Century M. & M., Utah	Aug. 31	Sept. 17	0.01
Winona, Mich.	Sept. 14	.....	1.00
Utah Con. M. & M.	Aug. 25	Sept. 7	0.001

Monthly Average Prices of Metals

SILVER

Month.	New York.		London.	
	1908.	1909.	1908.	1909.
January	55.678	51.750	25.738	23.894
February	56.000	51.472	25.855	23.706
March	55.365	50.468	25.570	23.227
April	55.505	51.428	25.133	23.708
May	52.795	52.905	24.377	24.349
June	53.663	52.588	24.760	24.166
July	53.115	51.043	24.514	23.519
August	51.683	51.125	23.858	23.588
September	51.720	.....	23.877	.....
October	51.431	.....	23.725	.....
November	49.647	.....	22.933	.....
December	48.766	.....	22.493	.....
Total	52.864	.....	24.402	.....

New York, cents per fine ounce; London, pence per standard ounce.

COPPER

	NEW YORK.				LONDON.	
	Electrolytic		Lake.			
	1908.	1909.	1908.	1909.	1908.	1909.
January	13.726	13.893	13.901	14.280	62.386	57.669
February	12.905	12.949	13.098	13.295	58.786	61.196
March	12.704	12.387	12.875	12.826	58.761	56.231
April	12.743	12.56½	12.928	12.93½	58.331	57.368
May	12.598	12.893	12.788	13.238	57.387	59.389
June	12.675	13.214	12.877	13.548	57.842	59.627
July	12.702	12.880	12.933	13.363	57.989	58.556
August	13.462	13.007	13.639	13.296	60.500	59.393
September	13.388	.....	13.600	.....	60.338	.....
October	13.354	.....	13.646	.....	60.139	.....
November	14.130	.....	14.386	.....	63.417	.....
December	14.111	.....	14.411	.....	62.943	.....
Year	13.208	.....	13.424	.....	59.902	.....

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

TIN AT NEW YORK

Month.	1908.	1909.	Month.	1908.	1909.
January	27.380	28.060	July	29.207	29.125
February	28.978	28.290	August	29.942	29.966
March	30.577	28.727	September	28.815	.....
April	31.702	29.445	October	29.444	.....
May	30.015	29.225	November	30.348	.....
June	28.024	29 322	December	29.154	.....
			Av. Year.	29.465	.....

Prices are in cents per pound.

LEAD

Month.	New York.		St. Louis	London.	
	1908.	1909.	1909.	1908.	1909.
January	3.691	4.175	4.025	14.469	13 113
February	3.725	4.018	3.868	14.250	13 313
March	3.838	3.986	3.835	13.975	13.436
April	3.993	4.168	4.051	13.469	13.297
May	4.253	4.287	4.214	12.938	13.225
June	4.466	4.350	4.291	12.600	13.031
July	4.744	4.321	4.188	13.000	12.563
August	4.580	4.363	4.227	13.375	12.475
September	4.515	.....	.....	13.125	.....
October	4.351	.....	.....	13.375	.....
November	4.330	.....	.....	13.538	.....
December	4.213	.....	.....	13.156	.....
Year	4.200	.....	.....	13.439	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month.	New York		St. Louis.		London.	
	1908.	1909.	1908.	1909.	1908.	1909.
January	4.513	5.141	4.363	4.991	20.563	21.425
February	4.788	4.889	4.638	4.739	20.875	21.563
March	4.665	4.757	4.527	4.607	21.075	21.438
April	4.645	4.965	4.495	4.815	21.344	21.531
May	4.608	5.124	4.458	4.974	19.906	21.975
June	4.543	5.402	4.393	5.252	19.000	22.000
July	4.485	5.402	4.338	5.252	19.031	21.969
August	4.702	5.729	4.556	5.579	19.350	22.125
September	4.769	.....	4.619	.....	19.563	.....
October	4.801	.....	4.651	.....	19.750	.....
November	5.059	.....	4.909	.....	20.875	.....
December	5.137	.....	4.987	.....	20.625	.....
Year	4.726	.....	4.578	.....	20.163	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

THE MINING INDEX

The editors of this paper read all the important publications of the world that relate to mining and the treatment of minerals. This index is published as a reference for all interested and to make it impossible for readers of the ENGINEERING AND MINING JOURNAL to miss any important article published anywhere.

We will undertake to furnish a copy of any article (if in print) in the original language, for the price quoted. Where no price is quoted the cost is unknown. These papers are not kept in stock, but must be ordered from the publisher; hence there will be some delay for foreign papers.

No accounts can be opened for these small amounts, but remittance must be sent with order. For the convenience of those making small but frequent remittances, coupons are furnished at the following prices: 20 cents each, six for $1.00, thirty-three for $5.00 and one hundred for $15.00. This arrangement will be especially appreciated by foreign readers and men in distant mining camps. Where remittances are made in even dollars we will return the excess over an order in coupons upon request.

ALUMINUM.

10159—PREPARATION OF ALUMINUM in the Laboratory. S. A. Tucker. (Electrochem. and Met. Ind., July, 1909; ¾ p., illustrated.) 40c.

BARYTES.

10160—OCCURRENCE AND USES. Barium (Ba). E. B. Wilson. (Mines and Minerals, July, 1909; 2 pp.) 20c.

10161—PRODUCTION of Barytes and Strontium in 1908. Ernest F. Burchard. (Advance chapter from Mineral Resources of the U. S., Calendar Year 1908; 4½ pp.)

BORAX.

10162—ARGENTINA—The Borate Deposits of the Atacama Desert, Argentine Republic. (Min. Journ., June 12, 1909; 1 p.) 40c.

CEMENT.

10163—CEMENT INDUSTRY in the United States in 1908. Edwin C. Eckel. (Advance chapter from Mineral Resources of the U. S., Calendar Year 1908; 14½ pp.)

CLAY.

10164—CORNWALL—Geological Features Observable at the Carpalla China-Clay Pit in the Parish of St. Stephens. J. H. Collins. (Quart. Journ. Geol. Soc., Vol. LXV, 1909; 6½ pp., illustrated.)

COAL AND COKE.

10164a—ACCIDENTS—The Prevention of Accidents in Coal Mines. E. H. Coxe. (Eng. and Min. Journ., Aug. 28, 1909; 3 pp.) Abstract of paper before a meeting of the Alabama Coal Operators Assn. 20c.

10165—AFRICA—The South Rand Colliery. (So. Afr. Min. Journ., July 17, 1909; 1½ pp., illustrated.) 20c.

10166—BENZINE LAMPS—Description de la Lampesterie a Benzine de la Société Anonyme John Cockerill à Seraing. V. Brien. (Ann. des Mines de Belgique, Tome XIV, 3 livr., 1909; 5 pp., illustrated.)

10167—CANADA AND UNITED STATES—Reciprocity in Coal—A Western Point of View. E. Jacobs. (Can. Min. Journ., August 1, 1909; 7½ pp., illustrated.) 20c.

10168—COAL-CUTTING and Conveying in a Seam of Medium Thickness. C. Gaunt. (Min. Eng., July 1909; 4½ pp., illustrated.) 20c.

10169—COAL DUST—British Coal Dust Experiments. (Iron and Coal Tr. Rev., July 30, 1909; 1⅔ pp., illustrated.) 40c.

10170—COAL DUST—El Polvo del Carbon. W. Galloway. (Revista Minera, July 24, 1909; 1 p.) Paper read before the International Congress of Applied Chemistry, June, 1909. 40c.

10171—COAL DUST—French Coal Dust Experiments. M. J. Taffanel. (Coll. Guard., August 6, 1909; 4⅓ pp., illustrated.) Description of the experimental station at Liévin, which has been established by the Comite-Central des Houillères de France. To be continued. 40c.

10172—COAL DUST AND EXPLOSIONS—Les Poussières de Houille. M. J. Daniel. (Ann. des Mines, Feb., 1909; 76 pp., illustrated.)

10173—COAL WASHERY PLANT CONTROL. G. R. Delamater. (Mines and Minerals, August, 1909; 4 pp. illustrated.) 20c.

10174—COKE—Koppers Ammonia Sulphate Plant. (Progressive Age, July 1, 1909; 4 pp., illustrated.) 40c.

10175—COKE—The Carbonization of Coal in By-Product Coke Ovens. E. Lloyd. (Eng. and Min. Journ., Aug. 7, 1909; 1 p., illustrated.) Abstract of paper before the International Congress of Applied Chemistry, London, June 1, 1909. 20c.

10176—DUST EXPLOSIONS in Coal Mines. Franklin Bache. (Trans. A. I. M. E., August, 1909; 6½ pp.)

10177—ELECTRICITY in Mines. George R. Wood. (Proc. Am. Inst. Elec. Engrs., August, 1909; 11 pp.)

10178—EXPLOSIONS—Some Simple Causes of Mine Explosions. L. D. Tracy. (Eng. News July 1, 1909; 2 pp.)

10179—FLUSHING—Notes recueillies dans quelques mines du Bassin Rhénan-Westphalien dans le Nord et dans le Pas-de Calais sur le Remblayage Hydraulique. A. Baijot and A. Demeure. (Pub. Association des Ingénieurs de l'École des Mines de Mons, T. III, 1909; 54 pp., illustrated.)

10180—GREAT BRITAIN—Coal Mines Inspection in 1908. (Supplement to Coll. Guard., August 6, 1909; 25 pp., illustrated.) Digest of the reports of H. M. Inspectors of Mines. 40c.

10181—HOISTING AND COAL-HANDLING PLANT Operated by the H. W. McNeill Co., Ltd., at the No. 2 Mine, Canmore, Alberta. W. G. Flint. (Mines and Minerals, August, 1909; 1 p., illustrated.) 20c.

10182—INCLINED SEAMS—The Working of the Inclined Seams in the St. Etienne Coalfield, at the Montrambert and La Béraudiere Collieries. H. C. Annett. (Trans. North of England Inst. Min. and Mech. Engrs., March, 1909; 36 pp. illustrated.)

10183—KENTUCKY—The Middlesboro Coalfield in Kentucky. J. Howard. (Eng. and Min. Journ., Aug. 14, 1909; 2½ pp., illustrated.) 20c.

10184—LOW-GRADE FUELS—The Utilization of Low-Grade Fuels in the United States. O. K. Zwingenberger. (Electrochem. and Met. Ind., August, 1909; 3½ pp., illustrated.) Paper read before the Am. Inst. of Chem. Engineers, June 24, 1909. 40c.

10185—MINE FIRE—Discussion on the Underground Fire at Hamstead Colliery. (Trans. North of England Inst. Min. and Mech. Engrs., March, 1909; 7 pp.)

10186—MINE FIRE—Sealing Off Summit Hill Mine Fire. H. H. Stoek. (Mines and Minerals, August, 1909; 4 pp., illustrated.) 20c.

10187—MINE FIRE—Sealing Shafts After Explosion. J. A. Garcia. (Mines and Minerals, August, 1909; 3½ pp., illustrated.) Describes an attempt to extinguish a fire by sealing off the shafts at Mine No. 18 of the Dering Coal Co., West Frankfort, Ill. 20c.

10188—MINE GASES—Notes on Explosive Mine Gases and Dusts with Special Reference to Explosions in the Monongah, Darr. and Naomi Coal Mines. Rollin T. Chamberlin. (U. S. Geol. Surv., Bull. 383, 1909; 65 pp., illustrated.)

10189—NEWFOUNDLAND—Coal Areas of Newfoundland. James P. Howley. (Can. Min. Journ., August 1, 1909; 2½ pp., illustrated.) 20c.

10190—OXYGEN IN COAL—The Effect of Oxygen in Coal. David White. (U. S. Geol. Surv., Bull. 382, 1909; 74 pp., illustrated.)

10191—PEAT—The Gasification of Peat with Recovery of Chemical By-Products. Charles A. Davis. (Cassier's Mag., August, 1909; 11 pp.) 40c.

10192—PROSPECTING ANTHRACITE MINES by Drill Holes. Frank Lynde. (Eng. and Min. Journ., Aug. 7, 1909; 3 pp., illustrated.) 20c.

10193—RESCUE WORK—Description de la Station de Sauretage des Charbonnages de la Société Anonyme John Cockerill, à Seraing. V. Brien. (Ann. des Mines de Belgique. Tome XIV, 3 livr., 1909; 16 pp., illustrated.)

10194—RESCUE WORK—Mine Rescue Laboratory at the University of Illinois. R. Y. Williams. (Mines and Minerals, July, 1909; 1 p., illustrated.) 20c.

10195—RESCUE WORK—Portable Oxygen in a Mine Rescue. James Robertson. (Min. Sci., August 12, 1909; 2½ pp.) 20c.

10196—SIBERIA—Coal Mining on the Kirghese Steppe, in the Akmolinsk District of Southwestern Siberia. E. Watson. (Trans. North of England Inst. Min. and Mech. Engrs., March, 1909; 9 pp., illustrated.)

10197—SPONTANEOUS HEATING of Coal, Particularly during Shipment. Richard Threlfall. (Journ. Soc. Chem. Ind., July 31, 1909; 14 pp., illustrated.)

10198—TRANSPORTATION—Aerial Tramway for Coal Transportation. Robert M. Magraw. (Mines and Minerals, July, 1909; 4 pp. illustrated.) Describes installation of the Montana Coal and Coke Company at Electric, Montana. 20c.

10199—VENTILATION—Notes et Résultats d'Expériences sur un Ventilateur Rateau etabli au Siège de Linsi des Charbonnages de Kaiping (Chine). L. Demaret. (Pub. Association des Ingénieurs de l'École des Mines de Mons, T. III, 1909; 7 pp.)

10200—VIRGINIA—Coal Operations in the Clinchfield Region. William H. Stone. (Mfrs. Rec., July 8, 1909; 4¾ pp., illustrated.) 20c.

10201—WASHINGTON—The Coal Resources of Washington. R. P. Tarr. (Mines and Minerals, August, 1909; 3 pp., illustrated.) 20c.

10202—WEST VIRGINIA—The Kanawha Region, W. Va. H. H. Stoek. (Mines and Minerals, August, 1909; 4½ pp., illustrated.) 20c.

COPPER.

10203—ALLOYS—On the Magnetic Properties of Certain Copper Alloys. A. D. Ross and R. C. Gray. (Electrician, August 6, 1909; 1½ pp. illustrated.) 40c.

10204 — ARIZONA — Ray Consolidated Mines. R. L. Herrick. (Mines and Minerals, July, 1909; 3¼ pp., illustrated.) 20c.

10205—BLAST FURNACE SMELTING—Copper Blast Furnace Smelting at Anaconda. C. Offerhaus. (Eng. and Min. Journ., Aug. 7, 1909; 7 pp., illustrated.) 20c.

10206—BLAST FURNACE SMELTING—Peroxidation of Iron in Blast Furnace. A. Rizo-Patron. (Eng. and Min. Journ., Aug. 21, 1909; 2 pp.) 20c.

10207—BRASS MELTING — Interesting Notes on Brass Melting. Charles T. Bragg. (Foundry, July, 1909; 2½ pp.) 20c.

10208—BRITISH WEST INDIES — The Copper Mines of Jamaica, British West Indies. Alex. E. Outerbridge. (Eng. Mag., August, 1909; 13 pp., illustrated.) 40c.

10208a—CALIFORNIA—Copper Mines and Smelteries of Shasta County. George A. Packard. (Eng. and Min. Journ., Aug. 28, 1909; 6½ pp., illustrated.) 20c.

10209—CALIFORNIA — The Mammoth Mine and Smelter in California. A. H. Martin. (Min. Wld., Aug. 7, 1909; 2½ pp. illustrated.) 20c.

10210 — MANSFELD COPPER DEPOSITS—Le Gisement et le Traitement des Minerais de Cuivre du Mansfeld. Leon Demaret. (Ann. des Mines de Belgique, Annee, 1909, Tome XIV, 3 lire., 11 pp., illustrated.)

10211—ORE DEPOSITS—Garnet Contact Deposits of Copper and the Depths at Which They are Formed. Chas. R. Keyes. (Economic Geology, June, 1909; 7½ pp., illustrated.) 60c.

10212—ORE-DRESSING PRACTICE. S. F. Shaw. (Los Angeles Min. Rev., July 3, 1909; 2 pp.)

10213—SMELTING—The Partridge Hot Blast Smelter. Hugh G. Elwes. (Min. Wld., August 14, 1909; 1 p. illustrated.) 20c.

10214—TEMPERATURE OF COPPER—The Estimation of the Temperature of Copper by Means of Optical Pyrometers. G. K. Burgess. (Electrochem. and Met. Ind., August, 1909; 2 pp., illustrated.) 40c.

10215—VERMONT COPPER COMPANY, The. A. H. Fay. (Eng. and Min. Journ., Aug. 21, 1909; 1½ pp., illustrated.) 20c.

FELDSPAR.

10216 — PRODUCTION of Quartz and Feldspar in 1908. Edson S. Bastin. (Advance Chapter from Mineral Resources of the United States, Calendar Year 1908; 8 pp.)

FLUORSPAR.

10217—PRODUCTION of Fluorspar and Cryolite in 1908. Ernest F. Burchard. (Advance Chapter from Mineral Resources of the United States, Calendar Year 1908; 16 pp.)

10218—BARIUM AND SULPHUR in Fluorspar. H. G. Martin. (Journ. Ind. and Eng. Chem., July, 1909; 2 pp., illustrated.) 60c.

GOLD AND SILVER.

10219—AMALGAMATION—The Effect of Amalgamation of Different Intervals of Time Between the Dressings of Plates. G. O. Smart. (Journ. Chem., Met. and Min. Soc. of South Africa, June, 1909; 4 pp., illustrated.) 60c.

10220—ASSAY AND VALUATION of Gold-Bullion. F. P. Dewey. (Trans. A. I. M. E., August, 1909; 17½ pp.)

10221—AUSTRALIA—The Mines of Bendigo, Victoria. D. Clark. (Aust. Min. Stand., July 7, 1909; 1½ pp.) 40c.

10222—CALIFORNIA—Great Gold Belt in Amador County, Calif. William H. Storms. (Min. Wld., July 31, 1909; 3½ pp., illustrated.) 20c.

10223—CALIFORNIA—The Alleghany Mining District. A. H. Martin. (Min. Sci., July 8, 1909; 1½ pp.) 20c.

10224—COBALT, ONTARIO—Record of the Producing Mines of Cobalt District. Alex. Gray. (Min. Wld., July 24, 1909; 1⅔ pp.) 20c.

10225—COLOMBIA—Mineral Resources of the South of Colombia. F. P. Gamba. (Eng. and Min. Journ. Aug. 14, 1909; 1 p.) 20c.

10226—COSTS AND PROFITS—The Relation of Costs to Profits in Mines of the Rand. H. M. Thomas. (So. Afr. Min. Journ., July 17, 1909; 3 pp., illustrated.) 20c.

10227—CYANIDATION — An Investigation of Zinc Box White Precipitates. R. F. Coolidge. (West. Chem. and Met., Aug., 1909; 9 pp.) 80c.

10228 — CYANIDATION — Methods for Assaying in Cyanide Plant. W. H. Seamon. (West. Chem. and Met., Aug., 1909; 3½ pp.) 80c.

10229—CYANIDATION OF SILVER ORES. Theo. P. Holt. (Min. and Sci. Press, July 31, 1909; 3¼ pp., illustrated.) 20c.

10230—DREDGING—Modern Gold Placer Dredging. George B. Massey, 2nd. (Cassier's Mag., August, 1909; 14 pp., illustrated.) 40c.

10231—GOLD STEALING on the Rand. (So. Afr. Min. Journ., July 17 1909; 1½ pp.) 20c.

10232—INDIA—Ten Years' Review of the Mysore Gold Mine. T. Lington. (Min. Wld., August 14, 1909; 1 p.) 20c.

10233—MEXICO—Geological Formation of Mexico's Silver Mines. A. F. J. Bordeaux. (Min. Wld., July 3, 1909; 2 pp., illustrated.) 20c.

10234—MILLING—Pittsburg Silver Peak Mill at Blair, Esmeralda Co., Nevada. Henry Hanson. (Mines and Minerals, July, 1909; 4 pp., illustrated.) 20c.

10235—NEVADA—The Comstock Mines Today. Whitman Symmes. (Min. and Sci. Press, July 3, 1909; 2¼ pp., illustrated.) 20c.

10236—NICARAGUA—Notes on the Nicaraguan Goldfields. M. R. Walker. (Eng. and Min. Journ., Aug. 7 1909; 1 p., illustrated.) 20c.

10237—ONTARIO—South Lorain Silver Area. A. G. Burrows. (18th Ann. Rep. of Bureau of Mines, Vol. XVIII, Part II, 1909; 10½ pp., illustrated.)

10238—ONTARIO—The Gowganda and Miller Lakes Silver Area. A. G. Burrows. (18th Ann. Report of Bur. of Mines, Vol. XVIII, Part II, 1909; 20 pp., illustrated.)

10239—ORE-DEPOSITION at Aspen, Colo. J. Edw. Spurr. (Economic Geology, June, 1909; 19½ pp.) 60c.

10240—ORE-DRESSING PRACTICE. S. F. Shaw. (Los Angeles Min. Rev., July 24, 1909; 1¼ pp.) 20c.

10241—ORE TREATMENT—Treating Low-Grade Refractory Ores of Mexico. Mark R. Lamb. (Min. Wld., July 3, 1909; 3 1/3 pp., illustrated.) 20c.

10242—ORIGIN OF NUGGETS and Metallic Masses in Veins. Arthur Lakes. (Min. Sci., July 8, 1909; 2 pp., illustrated.) 20c.

10243—PATIO PROCESS—History and Development of the Patio Process. C. P. Duarte. (Min. Wld., July 3, 1909; 3 pp., illustrated.) 20c.

10244—PERU—The Auriferous Veins of Posco, Province of Camana, Peru. Luis Pflucker. (Min. Journ., July 31, 1909; 1 p.) 40c.

10245—PLACER EXAMINATIONS. Arthur Lakes, Jr. (Mines and Minerals, July, 1909; 4 pp., illustrated.) 20c.

10246—PLACER TESTING—Modern Placer Testing. G. R. E. Kennedy. (Can. Min. Journ., Aug. 15 1909; 1 p., illustrated.) 20c.

10247—PLACERS of Tierra Del Fuego. S. H. Loram. (Min. and Sci. Press, July 24, 1909; 3½ pp.) 20c.

10248—PLACERS of Waldo, South Oregon. John M. Nicol. (Min. and Sci. Press, July 24, 1909; 2 pp., illustrated.) 20c.

10249—PLACERS—Some Ore Deposits Connected with Placers. Matt W. Alderson. (Min. Wld., July 24, 1909; 2 pp., illustrated.) 20c.

10250—QUEENSLAND — The Etheridge Goldfield. Walter E. Cameron. (Geol. Surv. of Queensland, Pub. No. 219; 1909; 19 pp., illustrated.)

10251—SMELTING OF GOLD PRECIPITATES and Bullion with Oil Fuel. A. Yates. (Journ. Chem., Met. and Min. Soc. of South Africa, June, 1909; 2 pp.) 60c.

10252—STAMP MILLS—Some of the Large Stamp Mills of the World—III. Chas. C. Christensen. (Min. Wld., July 10, 1909; 2 pp., illustrated.) 20c.

10253—TASMANIA—Round Hill Silver-Lead Mine. Devonport (T). (Aust. Min. Stand., June 2, 1909; 1⅔ pp., illustrated.) 40c.

10254—TUBE-MILL LINERS. F. C. Brown. (New Zealand Mines Rec., April 16, 1909; 4 pp., illustrated.) 40c.

10255—UTAH—The Sevier Consolidated and Its Possibilities. W. C. Higgins. (Salt Lake Min. Rev., Aug. 15, 1909; 3½ pp., illustrated.) 20c.

GRAPHITE.

10256—CEYLON—The Mining of Graphite in Ceylon. (Foundry, July, 1909; 3 pp., illustrated.) 20c.

IRON AND STEEL.

10257—ALABAMA—Economic Features of the Birmingham District. J. L. Pultz. (Eng. and Min. Journ., Aug. 14 1909; 5 pp., illustrated.) 20c.

10258—ALABAMA—Operating Companies of Birmingham District. J. L. Pultz. (Eng. and Min. Journ., Aug. 21, 1909; 3½ pp., illustrated.) 20c.

10259—ANNEALING—Oil vs. Gas, Coal or Coke Flame for Annealing or Tempering. G. P. Blackiston. (Iron. Tr. Rev., July 1, 1909; 1 p., illustrated.) 20c.

10260 — ANNEALING — Pyrometry in the Annealing Room. H. S. Stupakoff. (Iron Tr. Rev., July 2 and August 5, 1909; 5 pp.) 40c.

10261—BLAST FURNACE GAS—The Development of Blast Furnace Gas Purifying. C. Flossel. (Gas Engr's. Mag., July 15, 1909; 2 pp., illustrated.) 20c.

10262—CAST IRON—The Permanent Mold and Its Effect on Cast-Iron. E. A. Custer. (Electrochem. and Met. Ind., August, 1909; 3 pp. illustrated.) Paper read before the Am. Soc. for Testing Materials, June 30, 1909. 40c.

10263—CASTING—Die Schablonenformerei in Stahlformgiessereien. L. Treuheit. (Stahl u. Eisen, June 2, 1909; 5½ pp., illustrated.) 40c.

10264—CASTING—Eine neue Sandaufbereitung. C. Henning. (Stahl u. Eisen, June 2, 1909; 8 pp., illustrated.) 40c.

10265—CASTING—Ueber moderne Gussputzanlagen. W. Casnary. (Stahl u. Eisen, June 2, 1909; 6 pp., illustrated.) 40c.

10266 — CASTINGS—Making Malleable Castings. (Iron and Coal Tr. Rev., June 25, 1909; 2 pp., illustrated.) 40c.

10267—CASTINGS—Production of Malleable Castings. R. Moldenke. (Iron Tr. Rev., August 12, 1909; 1½ pp., illustrated.) 20c.

10268—CASTINGS—Steel Castings. (Proc. Engineers' Soc. West. Penn., July, 1909; 21 pp., illustrated.) Discussion of the subject by various members of the Society. 40c.

10269—CHARCOAL FURNACE—A Typical Hanging Rock Charcoal Furnace. (Iron Tr. Rev., August 12, 1909; 1½ pp., illustrated.) History of the Jefferson furnace at Oak Hill, Ohio. 20c.

10270—COLORADO—The Taylor Peak and Whitepine Iron-Ore Deposits, Colorado. E. C. Harder. (U. S. Geol. Surv., Bull. 380-E., 1909; 10½ pp. illustrated.)

10271—CORROSION—Inoxidation Processes for Protection of Iron and Steel. Alfred Sang. (Electrochem. and Met. Ind., August, 1909; 2 pp.) 40c.

10272—CUBA—The Residual Brown Iron Ores of Cuba. C. M. Weld. (Trans. A. I. M. E., August, 1909; 13½ pp., illustrated.)

10273—CUPOLA MELTING—Economy in Cupola Melting. J. W. Henderson. (Proc. Engineers' Soc. West. Penn. July, 1909; 18 pp., illustrated.) 40c.

10274—DESULPHURIZATION OF IRON—The Formation of Silicon Sulphide in the Desulphurization of Iron. W. Fielding. (Electrochem. and Met. Ind., August, 1909; 1 p.) Paper before the Faraday Society, June 15, 1909. 40c.

10275—DRY AIR BLAST—The Gayley Dry Air Blast. (Journ. Franklin Inst., July, 1909; 8 pp.) Report of the Franklin Institute

through its Committee on Science and the Arts, investigating the dry air blast for furnaces invented by James Gayley. 60c.

10275a — ELECTRIC FURNACES — The Treatment of Steel in Electric Furnaces. Henry M. Howe. (Eng. and Min. Journ., Aug. 28, 1909; 7 pp., illustrated.) Discusses arc furnaces, induction furnaces, dephosphorization, the oxidizing period, deoxidizing and desulphurizing, influence of manganese on desulphurization, removal of hydrogen and nitrogen, etc. 20c.

10276—ELECTRIC SMELTING—Der elektrische Ofen und der elektrische Schmelzprozess unter besonderer Berücksichtigung des Röchling-Rodenhauser Ofens. W. Rodenhauser. (Metallurgie, July 22, 1909; 9 pp., illustrated.) 40c.

10277—ELECTRIC SMELTING—The Application of the Lash Process to the Electric Furnace . F. A. J. Fitzgerald. (Iron Tr. Rev., July 1, 1909; 1⅔ pp., illustrated.) Paper before the Am. Electrochem. Soc. May 6, 1909. 20c.

10278—FERRO-BORON—The Investigation of Ferro-Boron. K. Iwai and J. C. Ballagh. (Min. and Sci. Press Aug. 7, 1909; 6½ pp.)

10279—FOUNDRY SANDS. Heinrich Ries and J. A. Rosen. (Mich. Geol. Surv., 1908; 85 pp., illustrated.)

10280—GEORGIA—Review of Fossil Iron Ore Deposits of Georgia. S. Mays Ball. (Eng. and Min. Journ., July 31, 1909; 4½ pp.) 20c.

10281—HIGH SPEED STEEL—The Manufacture of High-Speed Steel. O. M. Becker. (Cassier's Mag., July, 1909; 26 pp., illustrated.) Last of a series of articles treating of the grinding of high-speed tools. 40c.

10282—ILLINOIS—Extinct Iron Industry in Southern Illinois. Henry E. Birkinbine. (Iron Tr. Rev., August 5, 1909; 2⅓ pp.) 20c.

10283—LAKE SUPERIOR—Mining Methods in the Lake Superior Iron Mines. Allan Jobson. (Jernkontorets Annaler, June, 1909; 16 pp.) Describes various methods employed, especially in underground mining. Gives cost of labor explosives, etc.

10284—MAGNETIC PROPERTIES at High Excitations of a Remarkably Pure Specimen of Soft Norway Iron. B. O. Peirce. (Am. Journ. Sci., July, 1909; 8 pp., illustrated.) 40c.

10285—MINING METHODS—Improvement in Mining Methods at Cornwall Mine. Lebanon, Penn. (Iron Tr. Rev., August 5, 1909; 2½ pp., illustrated.) 20c.

10286—NEW MEXICO—The Hanover Iron-Ore Deposits, New Mexico. Sidney Paige. (U. S. Geol. Surv., Bull. 380-E., 1909; 15 pp., illustrated.)

10287—PACIFIC COAST—The Inauguration of Steel Making on the Pacific Coast. (Iron Tr. Rev., Aug. 19, 1909; 1½ pp., illustrated.) Description of the plant of the Irondale Steel Co. Seattle, Wash. for making steel bars and shapes. 20c.

10288—PIPING IN INGOTS—The Riemer Hot-Top Process of Preventing Piping in Steel Ingots. J. F. Springer. (Iron Tr. Rev., June 24, 1909; 7 pp., illustrated.) 20c.

10289—REFINING—Methods of Refining Steel in the Electric Furnace. J. B. C. Kershaw. (Cassier's Mag., July, 1909; 12 pp., illustrated.) 40c.

10290—REFINING—The Electric Refining of Steel. Its Place in the British Iron Industry. F. W. Harbord. (Iron Age, August 19, 1909; 3 pp.) From a paper before the West of Scotland Iron and Steel Inst. 20c.

10291—ROLLING MILL EQUIPMENT—Special Motor-Controlling Devices in the Rolling Mill of the Indiana Steel Company, Gary, Ind. (Elec. Wld., July 8, 1909; 3 pp., illustrated.) 20c.

10292—TESTING—Commercial Testing of Iron and Steel. W. F. Burrow. (Iron and Coal Tr. Rev., July 30, and Aug. 6, 1909; 2½ pp.) 60c.

10293—TEXAS—Iron Ores of Llano County, Texas. Wm. B. Phillips. (Mfrs. Rec., July 15, 1909; ¾ p.) 20c.

10294—VIRGINIA—The Iron Ores of the Appalachian Region in Virginia. E. C. Harder. (U. S. Geol. Surv. Bull. 380-E., 1909; 38 pp., illustrated.)

10295—WHITE SCALE ON STEEL—The Formation of White Scale on Steel and the Surface Decarbonzation of Pipe Annealed Steel. Charles M. Johnson. (Journ. Ind. and Eng. Chem., July, 1909; 3 pp., illustrated.) 60c.

LEAD.

10296 — SMELTING AND REFINING PRACTICE at Trail, B. C. A. J. McNab. (Can. Min. Journ., Aug. 15, 1909; 3 pp.) Continuation of article previously indexed. 20c.

MANGANESE.

10297 — UNITED STATES — Manganese Deposits of the United States. E. C. Harder. (U. S. Geol. Surv., Bull. 380-E, 1909; 22 pp.)

MICA.

10298—PRODUCTION of Mica in 1908. D. B. Sterrett. (Advance chapter from Mineral Resources of the U. S., Calendar Year 1908; 12 pp.)

MOLYBDENITE.

10299 — MAINE — The Molybdenite Deposits of Tunk Pond, Maine. B. W. Hills. (Min. Wld., August 7, 1909; 1¼ pp.) 20c.

PETROLEUM.

10300—CALIFORNIA—The Los Angeles Oil Industry. P. E. Barbour. (Eng. and Min. Journ., Aug. 21, 1909; 1½ pp.) 20c.

10301—GEOLOGICAL OCCURRENCE—The Changes in Crude Petroleum Effected by Diffusion Through Clay. David T. Day and J. Elliott Gilpin. (Journ. Ind. and Eng. Chem., July, 1909; 6 pp., illustrated.) 60c.

10302—ILLIONIS—Petroleum Fields of Illinois. H. Foster Bain. (Min. and Sci. Press, July 31, 1909; 3½ pp., illustrated.) 20c.

10303 — LIQUID FUEL. (Petrol. Rev., July 3, 1909; 1¼ pp.) Conclusion of lecture before the International Congress of Applied Chemistry. 40c.

10304 — MADAGASCAR OIL FIELDS. (South African Min. Journ., July 24, 1909; 1½ pp.) 20c.

10305 — MAIKOP PETROLEUM DISTRICT. (Petrol. Rev., July 31, 1909; 2 pp., illustrated.) Gives information concerning this district which lies in the northwest of the Caucasus mountains and South of the Cuban river, not far from Novorossisk. 40c.

10306 — MEXICO — Principal Petroleum-Bearing Regions of Mexico. J. D. Villarello. (Min. Wld., July 3, 1909; 3½ pp.) 20c.

10307—NATURAL GAS—Geology as Applied to the Formation in Which Natural Gas is Found in the Appalachian Regions. John A. Bownocker. (Progressive Age, July 1, 1909; 3 pp.) 40c.

10308—OIL SHALES in Scotland. R. Weed. (Iron and Coal Tr. Rev., August 6, 1909; 1⅓ pp., illustrated.) 40c.

10309—ORIGIN OF OIL, The. Arthur Lakes. (Min. Sci., August 12, 1909; 2 pp., illustrated.) 20c.

PHOSPHATE ROCK.

10310—PRODUCTION of Phosphate Rock in 1908. F. B. Van Horn. (Advance chapter from Mineral Resources of the U. S., Calendar Year, 1908; 15 pp.)

RARE METALS.

10311—NEPTUNITE—The Analysis of the Mineral Neptunite from San Benito County, Cal. W. M. Bradley. (Am. Journ. Sci., July, 1909; 2 pp.)

10312—RADIUM—Its Occurrence in Australia. S. Radcliff. (Aust. Min Stand., June 23, 1909; 2 pp., illustrated.) 40c.

10313—VANADIUM—Further Remarks on Vanadium and Its Estimation. George Auchy. (Journ. Ind. and Eng. Chem., July, 1909; 4 pp.) 80c.

SALT.

10314—REFINING Salt from the Great Salt Lake, Utah. Leroy A. Palmer. (Min. Wld., July 24, 1909; 2 pp., illustrated.) 20c.

SULPHUR AND PYRITE.

10315—ANALYSIS—Solfimetro per la Determinanizone Rapida Dell Solfo Contenuto nel Minerals. G. Oddo. (Rassegna Mineraria, July 21, 1909; 2½ pp., illustrated.) 40c.

10316—PRODUCTION of Sulphur and Pyrite in 1908. W. C. Phalen. (Advance Chapter from Mineral Resources of the U. S., Calendar Year, 1908; 15pp.)

TIN.

10317—BOLIVIA—The Origin of the Bolivian Tin Deposits. William R. Rumbold. (Economic Geology, June, 1909; 43 pp. illustrated.) 60c.

10318—CORNWALL—The Tin Mining Industry of Cornwall. P. Dvorkovitz. (Petrol. Rev., Aug. 14, 1909; 2 pp., illustrated.) 40c.

10,319—PRODUCTION of Tin in 1908, Frank L. Hess. (Advance chapter from Mineral Resources of the U. S., Calendar Year 1908; 11 pp.)

10,320—TASMANIA—Stanley River Tinfield, Tasmania. Hartwell Conder. (Aust. Min. Stand., June 16, 1909; 1½ pp., illustrated.) 40c.

10,321—TRANSVAAL TIN INDUSTRY—IV. J. E. Mills-Davies. (South African Min. Journ., July 24, 1909; 2 pp., illustrated.) Describes the Rooiberg mine. To be continued. 20c.

TUNGSTEN.

10,322—CANADA—Report on the Tungsten Ores of Canada. T. L. Walker. (Canada Dept. of Mines, Mines Branch, 1909; 56 pp., illustrated.)

ZINC.

10,323—MEXICO—Development of Zinc Mining Industry in Mexico. P. C. Hanna, T. W. Voetter and L. A. Martin. (Min. Wld, July 3, 1909; 2½ pp.) Covers the Northern, Central and Northwest districts. 20c.

10,324—ORE DRESSING—Der Elmore-Vakuum Prozess auf den Werken der "Zinc Corporation, Limited" zu Broken Hill Neu-Sud-Wales. T. Haege. (Oest. Zeit. f. B. u. H., July 31, 1909; 2½ pp., illustrated.) 40c.

10,325—ORE DRESSING—Elmore Process as Applied by Zinc Corporation. (Eng. and Min. Journ., July 31, 1909; 2½ pp.) Remarks by H. C. Hoover before a recent meeting of the Zinc Corporation, Ltd. 20c.

ECONOMIC GEOLOGY—GENERAL.

10,326—AUSTRALIA—Geological Features of the Furari River, Western Papua. T. N. Charpentier. (Aust. Min. Stand., June 30, 1909; 1⅓ pp., illustrated.)

10,327—DESERT WATER SUPPLY—Some Desert Watering Places in Southeastern California and Southwestern Nevada. Walter C. Mendenhall. (U. S. Geol. Surv., Water-Supply Paper 224, 1909; 98 pp., illustrated.) Physical features; climate; water supply; hints on desert traveling; main routes of travel; irrigating and artesian waters; description of springs.

10,328—FISSURES—The Laws of Fissures. Blamey Stevens. (Trans. A. I. M. E., Aug., 1909; 17 pp.)

10,329—GEOLOGICAL SURVEYING—Need of Instrumental Surveying in Practical Geology. B. S. Lyman. (Trans. A. I. M. E., Aug., 1909; 8 pp.)

10,330—LOST VEIN—The Recovery of an Ore Body or Lost Vein. A. Lakes. (Min. Wld., Aug. 21, 1909; 1½ pp., illustrated.) 20c.

10,331—METAMORPHISM—Chemical Composition as a Criterion in Identifying Metamorphosed Sediments. Edson S. Bastin. (Journ. of Geol., Vol. XVII, No. 5, July-Aug., 1909; 28 pp.) 60c.

10,332—METAMORPHISM of Glacial Deposits Frank Carney (Journ. of Geol., July-Aug., 1909; 14½ pp., illustrated.) 60c.

10,333—MEXICO—Mining in Northern Sinaloa, Mexico. E. A. H. Tays. (Min. and Sci. Press, July 24, 1909; 2 pp., illustrated.) 20c.

10,334—MEXICO—Physical and Geological Features of Mexico Mining. E. Ordonez. (Min. Wld., July 3, 1909; 1 p.) 20c.

10,335—NEW ZEALAND—Outline of New Zealand Geology. Chapter IV. James Parks. (New Zealand Mines Rec., April 16, 1909; 5½ pp., illustrated.) 40c.

10,336—ORE DEPOSITION — Richness and Depth. Gordon Surr. (Los Angeles Min. Rev., Aug. 7, 1909; 2 pp.) 20c.

10,337—OREGON—Geology and Water Resources of the Harney Basin Region, Oregon. Gerald A. Waring. (U. S. Geol. Surv., Water Supply Paper 231, 1909; 93 pp., illustrated.)

10,338—RADIO-ACTIVITY—La Radioactividad y la Geology. (Revista Minera, July 24, 1909; 2 pp.) 40c.

10,339—RECORDING GEOLOGICAL DATA. T. F. Field. (Mines and Minerals, Aug., 1909; 3 pp., illustrated.) 20c.

10340 — RUSSIA — La Metallogénie de l'Asie Russe. L. deLaunay. (Ann. de Mines, T. XV, 3 livr., 1909; 75 pp.)

10,341—WESTERN AUSTRALIA—Annual Progress Report of the Geological Survey for

the year 1908. (Perth, W. A., 1908; 21 pp. and 3 maps.)

MINING—GENERAL.

10,342—AFRICA—Mining in German East Africa. F. Gagel. (Min. Journ., Aug. 7, 1909; ½ p.) Translated from "Glückauf." 20c.

10,343—BELGIUM—Statistique de l'Industries Minerale de la Belgique en 1907. (Ann. des Mines, T. %V, 3 livr., 1909; 6 pp.)

10,344—BLASTING—Shot Firers. Pete Hanraty. (Mines and Minerals, July, 1909; 1½ pp.) 20c.

10,345—CALIFORNIA—Map of El Dorado County, Cal., showing Boundaries of the National Forests. (Cal. State Min. Bureau. 1909; 24x34 in.)

10,346—CALIFORNIA—Map of Placer County, California, showing Boundaries of the National Forests. (Issued by State Mining Bureau, San Francisco, 1909; 22x34 in.)

10,347—CAVING SYSTEM—Cananea Caving and Slicing Systems. R. L. Herrick. (Mines and Minerals, Aug., 1909; 7 pp., illustrated.) Description of the ore bodies and methods of mining adopted by the Cananea Consolidated Copper Company. 20c.

10,348—COMPRESSED AIR in Construction Work. Frank Richards. (Eng. Rec., Aug. 14, 1909; 1⅓ pp.) 20c.

10,349—DAMS—Earthern Dams. Frank Reed. (Aust. Min. Stand., June 23, 1909; 1 p., illustrated.) 40c.

10,350—DRAINAGE—Comstock Drainage Problems. Leon M. Hall. (Min. and Sci. Press, July 3, 1909; 3 pp., illustrated.) 20c.

10350a—DRILLING — Cost Analysis of Stone Consumption in Underground Diamond Drilling. B. N. Case. (Eng. and Min. Journ., Aug. 28, 1909; ½ p.) 20c.

10,351—FILING DATA—A System for Filing Fragmentary Literature. E. McCullough. (Eng. Rec., Aug. 14, 1909; 1½ pp.) 20c.

10,352—FLOW OF WATER—The "Lea" Water Recorder. (Engineering Aug. 13, 1909; 1½ pp., illustrated.) 40c.

10,353—FLOW OF WATER IN PIPES—Velocity of Flow of Water in Pipes. Leonard M. Green. (Min. and Sci. Press, July 31, 1909; 2 pp.)

10,354—GUATEMALAN MINING CODE. (Min. and Sci. Press, Aug 7, 1909; 1 p.)

10,355—HOISTING—Rope Strains in Hoisting. C. W. Beers. (Eng. and Journ., Aug. 21, 1909; 1½ pp., illustrated.) 20c.

10,356—HOISTING— Seilspannungen und-Schwingungen bei Beschleunigung sänderungen des Schachtförderseiles. A. Stör. (Oest. Zeit. f. B. u. H., July 3, 1909; 6 pp.) 40c.

10,357—IDAHO—New Laws Governing Mining in Idaho. (Min. Wld., Aug. 7, 1909; 1½ pp.) 20c.

10,358—LABOR—Handling Miners under the Wage System. W. L. Fleming. (Eng. and Min. Journ., Aug. 14, 1909; 1½ pp.) 20c.

10,359—LEASING in Cripple Creek District. C. W. Burgess. (Mines and Minerals, Aug., 1909; 6 pp., illustrated.) 20c.

10,360—MEXICAN LAW—Synopsis of the New Mining Laws of Mexico. M. C. Little. (Min. Wld., July 3, 1909; 3 pp.) 20c.

10,361—MEXICO—On Mule Back in the Sierra Madres, Chihuahua, Mexico. Charles McAnderson. (Min. Wld. July 3, 1909; 1 p.) 20c.

10,362—MEXICO—Reviews of Mining and Metallurgy in Mexico. George E. Griggs, W. Adams, W. D. Pearce, J. E. Spurr, G. H. Garrey and others. (Min. Wld, July 3, 1909; 6 pp, illustrated.) 40c.

10362a—MINE PROPS — Some German Mine Props. (Eng. and. Min. Journ., Aug. 28, 1909; 1½ pp., illustrated.) Translation of an article by Dr. Heckler in *Glückauf*, Apr. 8 and Oct. 24, 1908. 20c.

10362b—TIMBERING—Selection and Framing of Timber. W. L. Fleming. (Eng. and Min. Journ., Aug. 28, 1909; ½ p., illustrated.) 20c.

MINING AND METALLURGICAL MACHINERY.

10,363—MEXICO—The Proposed New Mining Law of Mexico. R. E. Chism. (Eng. and Min. Journ., July 31, 1909; 3 pp.) Read before Mex. Inst. of Mining and Metallurgy, July 12, 1909.) 20c.

10,364—MINE EXAMINATION—Reporting on Small Mines. Hartwell Conder. (Min. Journ., July 31, 1909; 1¾ pp.) 40c.

10,365—MINING METHODS—A Method of Mining in Heavy Ground. W. L. Fleming. (Eng. and Min. Journ., Aug. 21 1909; 1 p., illustrated.) 20c.

10,366—MINING METHODS—From Prospect to Mine. Etienne Ritter. (Min. Sci., July 8 and 15, 1909; 6 pp., illustrated.) These instalments of the series deal with methods of mining and extracting ore. 40c.

10,367 — NEWFOUNDLAND — Mineral Resources of Newfoundand. (Can. Min. Journ., Aug. 1, 1909; 3 pp., illustrated.)

10,368—NEW YORK—The Mining and Quarry Industry of New York State; Report of Operations and Production During 1908. D. H. Newland. (Bull. 132, N. Y. State Museum, 1909; 99 pp.)

10,369 — NEW ZEALAND — Gold and Scheelite Near Macraes, New Zealand. Percy Morgan. (Min. and Sci. Press, July 3, 1909; 1½ pp., illustrated.)

10,370—PORTUGUESE MINING NOTES—C. L. Major. (Eng. and Min. Journ., Aug. 14, 1909; 1 p., illustrated. 20c

10,371—PUMP DISCHARGE — A Simple Arrangement for Measuring Pump Discharge. J. A. Seager. (Eng. and Min. Journ., Aug. 7, 1909; ½ p., illustrated.) 20c.

10,372 — QUARRYING — Developments in Quarrying Processes. A. S. Atkinson. (Eng. and Min. Journ., July 31, 1909; 1½ pp.) 20c.

10,373—SHAFT SINKING by Freezing Process. S. F. Walker. (Mines and Minerals, Aug., 1909; 3½ pp.) 20c.

10,374—SHAFT SINKING—Concrete Linings in Shaft Sinking. R. H. Rowland. (Eng. and Min. Journ., Aug. 21, 1909; 2½ pp., illustrated.) 20c.

10,375—SHAFT SINKING—Modern Shaft Sinking. F. Donaldson. (Mines and Minerals, July, 1909; 5 pp., illustrated.) Continuation of article previously indexed, 20c.

10,376—SHAFT SINKING—The Application of Freezing Methods to Shaft Sinking and Tunnel Driving. C. S. McGinnis. (Min. Sci., Aug. 5, 1909; 1¾ pp.) 20c.

10,377—SOUTH AUSTRALIA—A General Synopsis of the State's Mining Laws. L. C. E. Gel. (So. Aust. Depart. of Intelligence, Bull., No. 8, May, 1909; 19 pp.)

10,378—SOUTH AUSTRALIA—A Review of Mining Operations in the State of South Australia during the Half-Year Ended december 31, 1908. H. Y. L. Brown. (Dept. of Mines, Adelaide, 1909; 48 pp., illustrated.)

10,379—TASMANIA—The Progress of the Mineral Industry of Tasmania for the Quarter Ending March 31, 1909. W. H. Wallace, Secretary for Mines. (Hobart, Tasmania; 1909; 12½ pp.)

10,380 — TESTING EXPLOSIVES — The Equipment of the United States Explosives-Testing Station. Clarence Hall. (Eng. Mag., July, 1909; 19 pp., illustrated.) 40c.

10,381—TESTING MINERALS—Simple Mineral Tests and How to Make Them. Gordon Surr. (Min. Wld., Aug. 14, 1909; 2 pp.) 20c.

10,382 — TIMBERING—Streckensicherung und Entspannungsverhelb in druckhaften Frözen. Dr. Niess. (Glückauf, July 3, 1909; 6 pp., illustrated.) 40c.

10,383—TIMBERS—The Preservation of Mine Timbers. J. M. Nelson. (Eng. and Min. Journ., July 31, 1909; 1½ pp.) Abstract of paper before the Coal Min. Inst. of America, June 29, 1909. 20c.

10,384 — TRANSPORTATION—The Influence of the Railroads of the United States and Canada on the Mineral Industry. James Douglas. (Bull. No. 58, I. M. M., July 8, 1909; 51 pp.)

10,385—VALUATION OF MINES, The. (Bull. 58, I. M. M., July 8, 1909; 6½ pp.) Contributed remarks on several papers previously indexed.

ORE DRESSING—GENERAL.

10386a—CONCENTRATION at the Butte Reduction Works. A. H. Wethey. (Eng. and Min. Journ., Aug. 28, 1909; 1½ pp., illustrated.) 20c.

10,386—CRUSHER—The New Cochran Crusher J. T. Barkelew. (Eng. and Min. Journ., Aug. 7 1909; 1 p., illustrated.) 20c.

10,387—ELECTRO MAGNETIC SEPARATION. J. N. Judson. (Eng. and Min. Journ. Aug. 7, 1909; 1 p.) Historical notes regarding this process. 20c.

10,388—ORE SAMPLING—Modern Practice of Ore-Sampling. D. W. Brunton. (Trans. A. I. M. E., Aug., 1909; 29½ pp., illustrated.)

METALLURGY—GENERAL.

10,389 — AMALGAMS OF ALKALI METALS—The Electrolytic Preparation of the Amalgams of the Alkali and Alkali-Earth Metals. G. McP. Smith and H. C. Bennett. (Journ. Am. Chem. Soc., July, 1909; 7 pp.) 80c.

10,390—COMBUSTION—Theory of Combustion. R. G. Griswold. (West. Chem. and Met., July 1909; 19 pp.) 80c.

10,391—ELECTRIC FURNACE OPERATION—Furnace Electrode Losses. C. A. Hansen (Electrochem. and Met. Ind., Aug., 1909; 1½ pp., illustrated.) 40c.

10,329 — ELECTRIC FURNACES—The Efficiency of Induction Furnaces. Joh. Härdén. (Electrochem. and Met. Ind., July, 1909; 2 pp., illustrated.) 40c.

10,393—FLUE GAS ANALYSIS, Simplified Results from. F. Kingsley. (Eng. Rec., Aug. 21, 1909; 1½ pp., illustrated.) 20c.

10,394—HYDRO-ELECTRO-METALLURGY—The Anderson Process. (Los Angeles Min. Rev., Aug. 14, 1909; 2 pp., illustrated.) Description of electrolytic method for reduction of metallic sulphides, carbonates and oxides now being demonstrated in Los Angeles. 20c.

10,395—METAL CUTTING by Means of Oxygen. (Engineering, Aug. 6, 1909; 2 pp., illustrated.) 40c.

10,396—METALLIC BRONZES—Moderne Bronzen. Z. V. Klinkenberg. (Eisen-Zeitung, July 3, 1909; 1 p.) 20c.

10,397—ORE TREATMENT—From Prospect to Mine. Etienne Ritter. (Min. Sci., July 29 and Aug. 5, 1909; 3 pp.) The final of a series of articles on prospecting and mining. 40c.

10,398 — PAINT PIGMENTS—Standard Nomenclature for Paint Pigments and Vehicles. (Eng.-Con., Aug. 11, 1909; 1½ pp.) 20c.

10,399—SMELTER—The Tintic Smelter. Leroy A. Palmer. (Mines and Minerals, July, 1909; 2 pp., illustrated.) 20c.

10,400 — SMELTER FUMES — Smelter Versus Oil Fume. E. B. Braden. (Min. and Sci. Press, Aug. 7, 1909; 2½ pp.) 20c.

10,401—SMELTER FUMES—The Waste of the Valuable Smelter Fumes. Thomas E. Lambert. (Min. Wld., July 31, 1909; 3 pp.) 20c.

10,402—SMELTING—Das Verhalten des Schwersnats bei hohen Temperaturen und seine Reaktion gegen einige hüttenmännisch wichtige Körper. W. Mostowitsch. (Metallurgie, July 22, 1909; 17½ pp., illustrated.) 40c

10,403—SMOKE PREVENTION—The Relation of the Character of Coals to the Prevention of Smoke. D. T. Randall. (Can. Engr., July 2, 1909; 2pp.) Paper read before the International Assn. for the Prevention of Smoke, June 24-26, 1909. 20c.

MINING AND METALLURGICAL MACHINERY

10,404—AERIAL TRAMWAYS—Ueber den Einfluss der Bewetterung auf die Spannungsänderungen der Grubenluft C. Mezger. (Glückauf, July 31, 1909; 4½ pp., illustrated.) 40c.

10,405—BELT CONVEYERS for Handling Materials. George F. Zimmer. (Cassier's Mag., Aug. 1, 1909; 12½ pp., illustrated.) 40c.

10,406—CASTING WHEEL—Walker Patent Casting Wheel Installed at the Electrolytic Refining and Smelting Co. Ltd. of Port Kembla, N. S. W. (Aust. Min. Standard, July 7, 1909; 2 pp., illustrated.) 40c.

10,407—CENTRIFUGAL PUMPS—Les Pompes Centrifuges. C. Honocq. (Rev. Univ. des Mines, June, 1909; 52 pp. illustrated.)

10,408—CENTRIFUGAL PUMPS—Special Duty Centrifugal Pumps. John B. Sperry. (Power, July 13, 1909; 2⅔ pp., illustrated.) 20c.

10,409 — CONVEYING MACHINERY—Recent Developments in Conveying Machinery for Coal and Ashes. Wilbur G. Hudson. (Eng. Mag., July and Aug., 1909; 33½ pp., illustrated.) 60c.

10,410—CRUSHING PLANTS. E. Soper. (Ind. Mag., July, 1909; 20 pp., illustrated.) 40c.

10411 — DEVELOPMENT WORK — From Prospect to Mine. Etienne Ritter. (Min. Sci., July 22, 1909; 2 pp.) Continuation of series of articles, dealing in the present instalment with the conditions under which various machinery plants are necessary. 20c.

10412—ELECTRICAL ACCIDENTS Around Machinery and Their Prevention. Robert J. Young. (Elec. Wld., Aug 12, 1909; 1½ pp., illustrated.) 20c.

10413 — ELECTRICITY — Electric Circuit Problems, Design and Testing—I. (Coll. Guard., Aug. 6, 1909; 1½ pp.) 40c.

10414—FUEL OIL PLANT—Experimenting with Fuel Oil. R. Renton Hind. (Power, July 6. 1909; 1⅓ pp., illustrated.) 20c.

10415—GAS ENGINES—Recent Developments in Large, Gas-Engine Design. Percy R. Allen. (Cassiers Mag., July and Aug., 1909; 34 pp. illustrated.) Discusses American, British and Continental practice in the development of the four-cycle engine. 60c.

10416 — GAS PRODUCERS — Experience with Suction Gas Producers. No. III. (Engineer, Aug. 13, 1909, 1 p., illustrated.) 40c.

10417—HYDRAULIC CONDUIT — The Design of an Eight-Mile High-Speed Hydraulic Conduit. L. Jorgensen. (Eng. News, Aug. 5, 1909; 1⅔ pp., illustrated.) 20c.

10418 — HYDRAULIC POWER—Development of Water Power at Great Falls, Montana. Alex. Leggat. (Min. Wld., July 24, 1909; 5 pp. illustrated.) 20c.

10419 — HYDRO-ELECTRIC DEVELOPMENT—The Colorado Yule Marble Company, Gunnison County, Colorado. S. S. Stone. (Can. Engineer, Aug. 20, 1909; 2 pp., illustrated.) 20c.

10420 — LABORATORY AGITATOR — Brown Type of Laboratory Agitator. T. S. Lawlor. (Min. and Sci. Press, Aug. 7, 1909; 1¼ pp., illustrated.) 20c.

10421—MELTING FURNACES—The Development of Melting Furnaces. L. J. Krom. (Metal Ind., Aug. 1909; 3 pp., illustrated.) 20c.

10422—POWER PLANT EQUIPMENT—The Shop Power Plant. Charles L. Hubbard. (Iron Age, July 15, 1909; 4½ pp., illustrated. 20c.

10,423—POWER STATION—Simmer Pan Power Station of the Victoria Falls and Transvaal Power Company near Germiston. (So. Afr. Min. Journ., June 12, 1909; 1½ p., illustrated.) 20c.

10424—PRODUCER GAS—The Generation of Producer Gas. Oskar Nagel. (Electrochem. and Met. Ind., Aug., 1909; 2 pp., illustrated.) 40c.

10425—PUMPING ENGINES—Compound Cornish Pumping Engines. W. P. Gauvain. (Min. and Sci. Press, July 10, 1909; 2½ pp., illustrated.) 20c.

10426—PUMPING PLANT at the Tombstone Consolidated. Elton W. Walker. (Eng. and Min. Journ., July 24, 1909; 3 pp., illustrated.) 20c.

10427—PUMPING PLANT—Steam-Driven Plant for Deep Wells and Boreholes. Alfred Towler. (Mech. Engr., July 2, 1909; 6 pp.) 20c.

10428 — PUMPS — Efficiency of the Air Lift as a Solution Pump. L. M. Green. (Eng. and Min. Journ., Aug. 7, 1909; 4½ pp., illustrated.) 20c.

10429—RESCUE APPARATUS—Die Vorgeschichte der Atmungsapparate im Bergbau. F. Jüngst. (Glückauf. June 12 and 19, 1909; 28 pp., illustrated.) 60c.

10430—SAFETY LAMPS—Die elektrische Grubenlampe "System tSach," H. Otten. (Bergbau, June 24, 1909; 2½ pp., illustrated.) (20c.

10431—SKIP—Automatic Dumping Skip for Vertical Shafts. Geo. C. McFarlane (Eng. and Min. Journ., June 26, 1909; 2 pp., illustrated.) 20c.

10432—SMOKE PREVENTION or Smoke Consumption. Harold V. Coes., (Eng. Mag., July and Aug., 1909; 34 pp., illustrated.) Classifies and discusses mechanical stokers, and deals with the choice of apparatus for burning various grades of fuel. 80c.

10433—SMOKE PREVENTION—The Prevention of Smoke. Wilfred Yorke. (Elec. Rev., London, July 2, 1909; 1¼ pp.) 20c.

10434 — SMOKELESS FURNACE, The. S. B. Flagg. (Ind. Mag., July, 1909; 5 pp.) 40c.

10435—STEAM AND GAS ENGINES—Fuel Consumption of Steam and Gas Engines in Practice. F. E. Junge. (Power, July 13, 1909; 1⅔ pp.) 20c.

10436—STEAM BOILER PRACTICE—The Significance of Drafts in Steam-boiler Practice. Henry Kreisinger. (U. S. Geol. Surv., Bulletin No. 367, 1909; 56 pp., illustrated.)

10437—STEAM BOILERS and Brickwork. (Coll. Guard., July 23, 1909; 1 p., illustrated.) 40c.

10438—STEAM METER—A New Steam Meter. E. A. J. Kuhnke. (Journ. Soc. Chem. Ind., June 30, 1909; 3 pp., illustrated.)

10439—STEAM PIPES—Condensation in Steam Pipes. W. R. Degenhardt. (Monthly Journ. West Aust. Chamber of Mines, June 30, 1909; 2 pp., illustrated.) 80c.

10440 — STEAM SHOVEL — Automatic Shovel for Underground Work. J. H. Polhemus. (Mines and Minerals, July 1909; 1 p., illustrated.) Describes the shovel used in the mines of the American Zinc, Lead and Smelting Company at Carterville, Mo. 20c.

10441 — STEAM TURBINE — The Low-Pressure Steam Turbine. R. M. Neilson. (Power, July 6, 1909; 7 pp., illustrated.) 20c.

10442—STEAM TURBINES—Die Regelung von Dampfturbineus und ihr Einfluss auf die Leitungsentwicklung in den einzelnen Druckstufen. H. Baer. (Zeit. des Vereines deutscher Ingenieure, July 3 and 10, 1909; 10 pp., illustrated.) 60c.

10443—STONE CRUSHING PLANT—New Stone-Crushing Plant of the Dolese and Shepard Company, at Gary, Ill. (Eng. Rec., July 24, 1909; 3 pp., illustrated.) 20c.

10444—TRANSPORTER—A Novel Type of Transporter for Mining Work. (Engineer, June 18, 1909; 1 p., illustrated.) 40c.

10445—TURBINE PLANT — Die Wasserkraftanlage Luzern-Engelberg. A. Stamm. (Die Turbine, June 20, 1909; 7 pp., illustrated.) 40c.

10446—TURBINES—Graphische Ausmittlung der Leistung einer Turbine bei verschiedenen Gangarten. J. Bartl. (Die Turbine, June 20, 1909; 2 pp., illustrated.) 40c.

10447—TURBINES—Ueber die Aussichten der verschiedenen Dampfturbinen Systeme im Schiffsturbinephau. H. Jansson. (Die Turbine, June 20, 1909; 2½ pp.) 40c.

ANALYTICAL CHEMISTRY.

10448—ARSENIC AND ANTIMONY—The Assay of Arsenic and Antimony. L. Parry (Min. Journ., July 31, 1909; ½ p.) 40c.

10449—ASSAYING—Metodos de Control. (Bol. de la Sociedad Nacional de Mineria, No. 147, May, 1909; 20 pp., illustrated.)

10450—MAGNESIUM—The Quantitative Separation of Calcium from Magnesium Walter C. Blasdale. (Journ. Am. Chem. Soc., Aug., 1909; 5 pp.) 60c.

10451—METAL ANALYSIS — Fortschritte auf dem Gebiete der Metallanalyse im Jahre 1909. T. Döring. (Chem.-Zeitung, July 29 and 31 1909; 2½ pp.) 40c.

10452—NITRATES IN WATER—A Study of the Phenosulphonic Acid Method for the Determination of Nitrates in Water. E. M. Chamot and D S.. Pratt. (Journ. Am. Chem. Soc., Aug., 1909; 8 pp., illustrated.) 80c.

10453—TIN AND ANTIMONY—The Separation of Tin and Antimony. L. W. McCay. (Journ. Am. Chem. Soc., March, 1909; 9 pp.) 80c.

10454—ZINC AND NICKEL—The Assay of Zinc and Nickel. L. Parry. (Min. Journ., June 12 and 26, 1909; ½ p.) 60c.

INDUSTRIAL CHEMISTRY.

10455—ATMOSPHERIC NITROGEN—The Fixation of Atmospheric Nitrogen. (Engineering, May 28, 1909; ¾ p.) 40c.

10456—ATMOSPHERIC NITROGEN—The Fixation of Atmospheric Nitrogen by the Badische Anilin und Sodafabrik Process. (Elec. Rev., July 2, 1909; 1¼ pp., illustrated.) Details taken from a paper by Dr. Schönherr before the Elektrotechnischer Verein. 20c.

10457—ATMOSPHERIC NITROGEN—The Manufacture of Artificial Nitrates from the Air in Norway. John B. C. Kershaw. (Elec. Rev. July 24, 1909; 4½ pp., illustrated.) 20c.

10458—ATMOSPHERIC NITROGEN—The Manufacture of Nitrates from the Atmosphere by the Electric Arc Birkeland-Eyde Process. Sam Eyde. (Electrician, June 11, 1909; 1 p., illustrated.)

10459—ATMOSPHERIC NITROGEN—The Manufacture of Saltpeter from the Air by the Process of the Badische Anilin and Soda Fabrik. (Elec. Rev., June 26, 1909; 3 pp., illustrated.) 20c.

10460—ATMOSPHERIC NITROGEN—The Oxidation of Atmospheric Nitrogen. Otto Schneider. (Journ. Ind. and Eng. Chem., Feb., 1909; 1¾ pp.) 80c.

10461—ATMOSPHERIC NITROGEN—The Process of the Badische Company for the Fixation of Atmospheric Nitrogen. (Electrochem. and Met. Ind., June, 1909; 2¾ pp., illustrated.) 40c.

10462—ATMOSPHERIC NITROGEN—The Utilization of Atmospheric Nitrogen, Particularly for the Manufacture of Air Saltpetre. A. Bernthsen. (Journ. Ind. and Eng. Chem., July, 1909; 10 pp.) 60c.

10463—ATMOSPHERIC NITROGEN—Utilization of Atmospheric Nitrogen Particularly for the Manufacture of Air Saltpeter. A. Bernthsen. (Electrician, June 11, 1909; 2 pp.) 40c.

10464—BASIC PHOSPHATIC SLAG. J. B. Lindsey. (Am. Fertilizer. May, 1909; 2 pp.) 20c.

10465—BASIC SLAG—The Lime in Basic Slag. James Hendrick. (Journ. Soc. Chem. Ind., July 31, 1909; 9 pp.)

10466—CHEMICALS—Some Interesting Points in the Manufacture of C. P. Chemicals. S. T. Baker. (Journ. Ind. and Eng. Chem., July, 1909; 2 pp.) 60c.

10467—EXPLOSIVES — Improvements in Production and Application of Guncotton and Nitroglycerine. F. L. Nathan. (Paper before Royal Inst. of Great Britain, Jan. 29, 1909; 15 pp.)

10468—EXPLOSIVES—Ueber die nitration der Baumwolle. C. Piest. (Zeit. f. angew. Chem., June 18, 1909; 9 pp.)

10469 — FERTILIZER AND ACID PLANTS. F. E. MacKnight. (Insurance Eng., Mar., 1909; 16 pp., illustrated.) 40c.

10470—HYDROCHLORIC ACID—Fabrication de l'Acide chlorhydrique au moyen du chlorure de magnésium. J. Schloesing. (La Revue des Produits Chimiques, June 1, 1909; ½ p.)

10471—LUBRICATING GREASES—Analyses and Friction Tests of Lubricating Greases. Horace W. Gillett. (Journ. Indus. and Eng. Chem., June, 1909; 8½ pp. illustrated.)

10472 — MERCURIC CYANIDE AND SILVER SALTS—Anwendung der Theorie der Komplexionen auf die Reaktions-Fähigkeit von Quecksilbercyanid gegen Silbersalze und gegen Alkalihydroxyde. K. A. Hofmann and H. Wagner. (Zeit f. Elektrochem., July 1, 1909; 6 pp.) 40c.

10473—NITRIC ACID and the Method of Its Manufacture. Richard K. Meade. (Min. Sci., Mar. 11 and 18, 1909; 4 pp., illustrated.) 40c.

10474—NITROLIME INDUSTRY—The Industries of the Kalkstickstoff (Nitrolime) Process and Allied Processes. N. Caro. (Chem. Tr. Journ., June 19 and 26, 1909; 3 pp.) 60c.

10475 — SULPHURIC ACID — Forni a Governo Manuale o Meccanico per la preparazione di solfo fuso e d'anidride solforosa. G. Oddo. (Rassegna Mineraria, July 1, 1909; 2 pp., illustrated.) 40c.

10476 — SULPHURIC ACID — Grundzuge eines Verfahrens, geringprozentige schwefligsaure Röstgase gleichzeitig unschädlich und nutzbar zu machen. F. Borchers. (Metallurgie, May 22, 1909; 6 pp., illustrated.) 40c.

10477—SULPHURIC ACID—On the Determination of the So, Losses in the Waste Gases of the Contact Process. H. Ljungh. (Chem. Engr., July, 1909; 2 pp., illustrated.) 40c.

10478—SULPHURIC ACID—Some Formulæ and Tables for Gas Calculations in the Contact Process for Sulphuric Acid. Alfred J Lotka. (Chem. Engr., Apr., 1909; 2½ pp.) 40c

10479—SULPHURIC ACID—The Concentration of Sulphuric Acid in Cast Iron Vessels. H. Friedrich. (Chem. Engr., July, 1909; 1½ pp., illustrated.) Translated from *Chem Zeit.*, 40c.

MATERIALS OF CONSTRUCTION.

10480—BRICK COLUMNS—Tests of Brick Columns and Terra Cotta Block Columns. Arthur N. Talbot and Buff A. Abrams. (Bull. No. 27, Univ. of Ill., Sept. 29, 1908; 50 pp. illustrated.)

10481—CONCRETE BEAMS—A Test of Three Large Reinforced Concrete Beams. A. N. Talbot. (Univ. of Ill., Bull. No. 28, October, 1908; 25 pp., illustrated)

10482—FIRE RESISTIVE PROPERTIES of Various Building Materials. Richard L. Humphrey. (U. S. Geol. Surv., Bull. 370, 1909; 99 pp., illustrated)

10483—OREGON AND WASHINGTON—Structural Materials in Parts of Oregon and Washington. N. H. Darton. (U. S. Geol. Surv, Bull 378, 1909; 33 pp., illustrated.)

10484 — PROTECTIVE COATINGS for Structural Material. R S. Perry (Journ. West Soc. Eng., June, 1909; 19 pp.) 40c.

10485—REINFORCED CONCRETE BEAMS—Formulas for the Strength of Reinforced-Concrete Beams. P. J. Robinson. (Proc. Inst., Civ. Engrs., Vol. CLXXIII, 1908; 24

10486 — REINFORCED CONCRETE BEAMS—Test of Reinforced Concrete Beams; Resistance to Web Stresses .Arthur N. Talbot. (Bull. No. 29, Univ. of Illinois, Jan. 4, 1909; 85 pp.)

10487—REINFORCED CONCRETE INDUSTRIAL BUILDINGS. J. P. H. Perry. (Journ. Soc. Chem. Ind, Apr. 30, 1909; 3½ pp.)

10488—TESTING BUILDING STONES—Die Prufung der Natürlichen Bausteine auf ihre. Prufung der Natürlichen Bausteine auf (Zeit. f. prakt., Geol. Sept., 1908; 17½ pp.) 40c.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

ABRASIVES—		
Carbons, good drill quality, carat		$50.00@75.00
Carborundum, f.o.b. Niagara Falls, powd.	lb.	.08
Grains	"	.10@.17
Corundum	"	.07@.10
Crushed Steel, f.o.b. Pittsburg	"	.05½@.06
Emery, in kegs; Turkish flour	"	.01¾@.02
Grains	"	.03½@.04
Naxos flour	"	.01¾@.02
Grains	"	.03½@.04
Chester flour	"	.01¾@.02
Grains	"	.03½@.04
Peekskill flour, f.o.b. Easton, Pa	"	.01½@.01¾
Grains, in kegs	"	.02½@.03
Garnet, per quality	sh. ton.	25.00@35.00
Pumice Stone, Am. Powd., 100 lb.		1.60@2.00
Italian, powdered	per lb.	.01¾@.01¾
Lump, per quality	"	.05@.30
Rottenstone, ground	"	.02@.04
Lump, per quality	"	.05@.30
Rogue, per quality	"	.05@.30
Steel Emery, f.o.b. Pittsburg	"	.07½@.07¾
ACIDS—		
Acetic 28%	lb.	.02¾ up
Boric	"	.07
Hydrofluoric, 30%	"	.02¾@.03½
" 48%	"	.06
" 60%	"	.10
Hydrochloric acid, 20°, per lb.		1.25@1.50
Nitric acid, 38°	per lb.	.04½@.04½
Sulphuric acid, 50°, bulk per ton.		$12 up
60°, 100 lb. in carboys.		.85@1.12½
60°, bulk, ton		16.00@18.00
66°, 100 lb. in carboys.		1.00@1.10
66°, bulk, ton		18.00
Oxalic	per lb.	.07½@.08¾
ALCOHOL—Grain 95%	gal.	2.64½
Denatured	"	.45@.47
Refined wood, 95@97%	"	.50@.55
ALUM—Lump	100 lb.	$1.75
Ground	"	1.85
Chrome Alum	"	.03¾@.05
ALUMINUM—Sulphate, com'l.	lb.	1.50@1.75
AMMONIA—24 deg. lb.	"	.04½@.05½
" 26 deg. lb	"	.04¾@.05¾
AMMONIUM—		
Bromide	lb.	.28
Carbonate	"	.07¾@.09½
Muriate grain	"	.05½@.06½
Lump	"	.09½@.09½
Sulphate, 100 lb.		2.75@2.90
Sulpho-cyanide com		.30
" " chem. pure		.40
ANTIMONY—needle, lump	"	.04@.04½
ARSENIC—white	"	.02½@.03
Red, Hoboken	"	.07
Saxony	"	.07½@.08
ASPHALTUM—		
Barbadoes	per ton.	50.00@80.00
West Indies	"	20.00@60.00
Egyptian	lb.	.11@.16
Gilsonite, Utah ordinary	per ton.	32.00@40.00
Trinidad	"	20.00@25.00
California	"	25.00@30.00
BARIUM—		
Carb. Lump. 80@90%	lg. ton.	30.00@35.00
Precipitated 96@98%		36.00@40.00
Powdered, 80@90%	lb.	.02@.02½
Chloride com'l	ton.	36.00@39.00
Nitrate powdered, in casks	lb.	.05@.06½
Blanc Fixe, dry, bbl.	per lb.	.02½@.04
BARYTES—		
Am. Ground	sh. ton.	12.00@17.00
Floated	"	17.00@20.00
Foreigd floated	"	20.00@22.00
BISMUTh—Sub-nitrate	lb.	1.40@1.45
BLEACHING POWDER—35% 100 lb		1.25@1.50
BLUE VITRIOL—(copper sulphate), carload, per 100 lb.		3¾@4.50
BONE ASH	lb.	.02½@.04
BORAX, sacks	"	.04½@.05
CALCIUM—Acetate, gray, 100 lb.		1.75@1.80
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. N. Y.	"	11.00@14.10
CEMENT—		
Portland, Am. 500 lb	bbl.	1.50@1.60
Foreign	"	2.25@2.90
"Rosendale," 300 lb.	"	.85
(in sacks)	"	.65
Slag cement	"	.75@1.25
CHROME ORE—		
New Caledonia 50% ex. ship N. Y.	per lg. ton.	14.00@16.00
Bricks, f.o.b. Pittsburg, per M.		175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	ton.	7.00@10.00
Foreign	"	10.00@17.50
COBALT—Oxide	lb.	1.10@1.70
COPPERAS—Bulk	100 lb.	$0.55
In bbls	"	.65@.75
In bags	"	.60@.70
CRYOLITE (carload)	lb.	.06½@.07½
FELDSPAR—Ground	sh. ton.	12.50@14.00
FIRE BRICK—		
American	per M.	30.00@40.00
Imported	"	30.00@45.00
St. Louis	"	16.00
Extra	"	20.00@23.00
Special extra	"	30.00@35.00
FIRE CLAY—F.o.b. St. Louis.		
St. Louis, extra quality	per ton.	5.00
" ordinary	"	2.50
FLUORSPAR—		
Domestic f.o.b. shipping port:		
Lump	lg. ton.	8.00@10.00
Ground	"	12.00@14.00
Foreign crude ex. dock		8.00@10.00
FULLER'S EARTH—Lump,	100 lb.	.80@.85
Powdered	"	.80@.85
GRAPHITE—Ceylon.		
Flying dust, finest to best	lb.	.02½@.04
Dust	"	.02¾@.05
Chip	"	.04@.08
Lump	"	.05½@.12
Large lump	"	.08¼@.10½
GYPSUM—		
Fertilizer	sh. ton.	5.00
Ground	"	4.00@7.00
INFUSORIAL EARTH—		
Ground Am. Best	lb.	.01¾@.02½
German	"	.02½@.02¾
LEAD—Acetate (sugar of) brown,	lb.	.07¾@.08
Nitrate, com'l	"	.07½@.08¼
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	7.50@8.50
Calcined, powdered	sh. ton.	26.00@37.00
Bricks, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	100 lb.	.90@1.25
Sulphate (Epsom salt)	100 lb.	.90@1.00
MANGANESE—		
Foreign, crude, powdered:		
70@75% binoxide	lb.	.01@.01½
75@85% binoxide	"	.01½@.01½
85@90% binoxide	"	.01½@.04
90@95% binoxide	"	.06½
Ore, 80%-85%	sh. ton.	16.00@32.50
MARBLE—Flour	sh. ton.	8.50@9.00
MINERAL WOOL—		
Slag, ordinary	sh. ton.	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
MONAZITE SAND—		
Guar. 97%, with 5% Thorium oxide, normal	lb.	.08 and up
NICKEL—		
Oxide, crude, lb. (77%) for fine metal contained		.47
Sulphate, single	lb.	.09@.11
Sulphate, double	"	.06½@.08
NITRATE OF SODA—		
100 lb. 95%		2.12½
95% for 1910		2.10
96% is 2½@7½c. higher per 100 lb.		
OZOKERITE—best	lb.	.14@.17
PAINTS AND COLORS—		
Litharge, Am. powdered	lb.	.05½@.06½
English glassmakers'	"	.08½@.09½
Lithopone	"	.03½@.07
Metallic, brown	sh. ton.	16.50@22.00
Red	"	14.00@18.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½@.03
French, washed	"	.01½@.02
Paris green, pure, bulk	"	.17½@.20½
Red lead, American	"	.06@.06½
Foreign	"	.08½@.09½
Turpentine, spirits bbl., per gal.		.58@.60
White lead, Am., dry	lb.	.05¾@.05¾
American, in oil	"	.06½@.07
Foreign, in oil	"	.09½@.09¾
Zinc white, Am. extra dry	"	.05½@.05¾
French, proc's, red seal, dry	"	.06¼@.07½
French, process, green seal, dry	"	.07¼@.10½
PHOSPHATES—Acid		.55@60c. per unit
*Fla., hard rock 77%		6.50@9.00
land pebble 68%		3.75@4.00
†Tenn., 78@80%		5.00@5.50
75%		4.75@5.00
68@72%		4.25@4.50
‡So. Car. land rock 60%		3.50@4.00

*F.o.b. Florida or Georgia ports. †F.o.b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

POTASSIUM—		
Bicarbonate crystal	lb.	$.07½
Powdered or granulated	"	.08
Bichromate, Am.	"	.08½@.08¾
Scotch	"	.10½
Bromide	"	.20
Carbonate (80@85%)	"	.03½@.04
Caustic, ordinary	"	.06½@.06¾
Elect. (90% KOH)	"	.05½@.06
Chloride (muriate), 100 lb.		1.90
Chlorate, powdered	"	.09½@.09¾
Crystals	"	.09@.09½
Cyanide (98@99%)		
Carloads (30,000 lb.)	"	18c.
5-ton lots		18½c.
Less than 5 tons		.20@.22½
Kainite, long ton, bulk, 8.50; bags,		9.50
Permanganate	lb.	.09½@.10½
Prussiate, yellow	"	.13@.13½
Red	"	.30@.33
Sulphate (basis 90%)	100 lb.	2.18@2.21
PYRITE—		
Domestic, non-arsenical, furnace size, f.o.b. mines	per unit.	11@11½c.
Domestic, non-arsenical, fines, per unit, f.o.b. mines		10@10½c.
Imported, non-arsenical, furnace size, ex-ship, per unit		.12@.12½
Imported, arsenical, furnace size, ex-ship, per unit		.11½@.12
Imported fines, arsenical, ex-ship, per unit		.09
Imported fines, non-arsenical, ex-ship, per unit		10½@11c.

Pyrite prices are per unit of sulphur. A deduction of 25c. per ton is made when ore for furnace is delivered in large lumps.

SALT—N. Y. com. fine	280 lb. bbl.	.72@1.13
N. Y. agricultural	sh. ton.	3.80@4.50
SALTPETER—Crude	100 lb.	4.00@4.50
Refined, crystals	"	5.50@6.00
SILICA—		
Ground quartz, ord'ry.	lg. ton.	10.00@15.00
Silex, ground	"	13.00@15.00
Silex, floated	"	35.00@40.00
Lump quartz	"	5.00@5.50
Glass sand	"	2.75
SILVER—Nitrate, crystals	oz.	.33½@.36¾
SODIUM—Acetate	lb.	.04½@.05
"Alkali," per 100 lb., 58/48		.80@.87½
Bicarb. soda, per 100 lb.		1.00@1.30c.
Soda, caustic, per 100 lb., 78/60		1.90@2.00
Soda, caustic, powdered		.02¾@.03¼
Salt cake, per 100 lb., bulk		.40 up
Salt cake, bbl		.65@.85
Soda, monohydrate, per lb.		1.40@1.75
Bichromate	lb.	.06¾@.06¾
Bromide	"	.20
Chlorate, com'l	"	.08½@.09½
Cyanide ("100% KCN")		
Carloads (30,000 lb.)	"	18c.
5-ton lots	"	18½c.
Less than 5 tons	"	19c.
Hyposulphite, Am.	"	1.30@1.50
Phosphate	100 lb.	2.20@2.50
Prussiate	"	.08½@.09
Sal soda, f.o.b. N. Y.	"	.65@.75
Foreign, f.o.b. N. Y.	"	.80@1.00
Silicate, com'l	"	.65@1.50
Sulphate, com'l (Glauber's salt)	100 lb.	.60@.80
Sulphate, com'l, calcined		.65@.85
STRONTIUM—Nitrate	lb.	.07½@.08
SULPHUR—Louisiana (prime) to New York	lg. ton.	22.00 up
To Boston, Philadelphia or Baltimore	"	22.50 up
Roll	100 lb.	1.85@2.15
Flour	"	2.00@2.40
Flowers, sublimed	"	2.20@2.60
Sicilian, extra qual., unmixed seconds, crude brimstone to New York	lg. ton.	$22.00
Other ports	"	22.50
TERRA ALBA—Fr. & Eng.	100 lb.	.80@1.00
TALC—Domestic	sh. ton.	15.00@20.00
French	"	18.00@25.00
Italian, best	"	30.00@40.00
TIN—Bi-chloride, 50%	lb.	.09½
Crystals	"	.21½@.22
Oxide, lb.	"	.32½@.35
URANIUM—Oxide	"	3.50@4.25
ZINC—Chloride sol., com. 20°	"	.02½
Chloride, granular	"	.05@.06
Dust	"	.05½@.06¾
Sulphate	"	.02½@.02¾

NOTE—These quotations are for ordinary wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. In the cases of some of the important minerals, such as phosphate rock, pyrites and sulphur, in which there are well established markets, the quotations fully represent the latter. But in the cases of some of the minor mineral products, the quotations represent what dealers ask of consumers and not what producers can realize in selling their output as matters of private contract.